CIO

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SEVEN DOLLARS

COVER STORY:

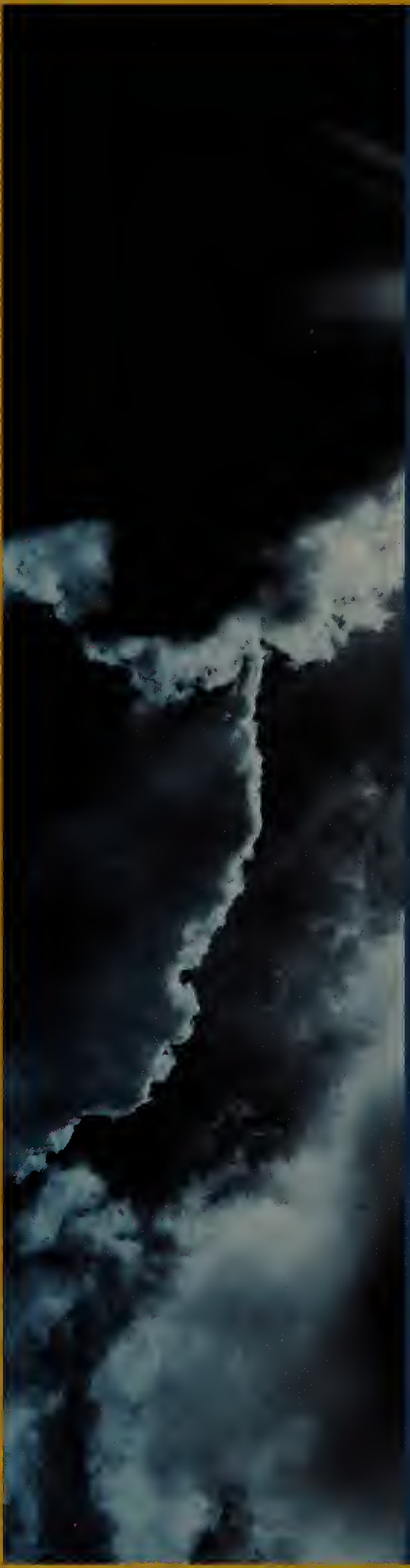
A Line Manager's IT Rite Of Passage

ALSO INSIDE:

Open Systems Update

Whirlpool Corp.'s
Walt Coleman

AN INTERNATIONAL DATA GROUP PUBLICATION



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CIO

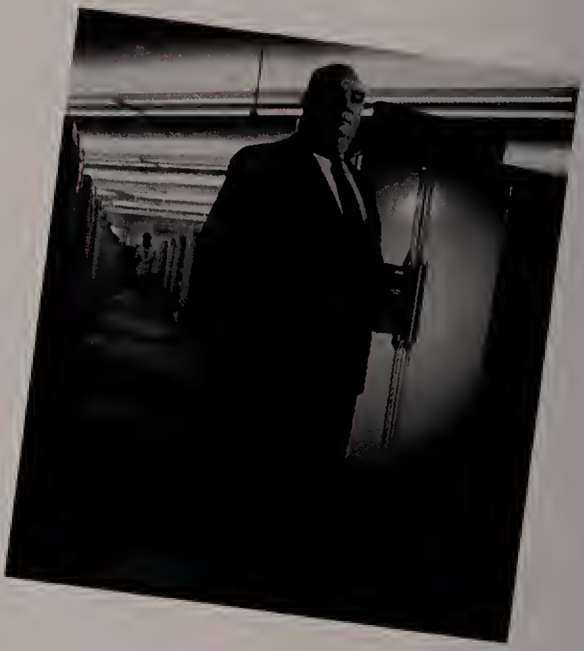
VOLUME 5, NUMBER 13

COVER STORY

The Education of a Line Manager 38

What happens when a non-IS general manager takes the helm of a major IS project without having the proper technical oversight in place? Plenty—and some of it not so good. Fortunately, Walt Coleman survived to tell the tale of how an emerging IS-business partnership kept Whirlpool Corp.'s new customer-service hot line from falling into the abyss.

By Lucie Juneau



Staying cool in a crisis **38**
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Getting IT out in the open **55**

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Birth of a Salesman 30

Budgets are down, external competition is up, and once-complacent CIOs are scrambling for ways to sell their services to a no-longer-captive audience.

By Meghan O'Leary

Gearing Up 48

Detroit's Big Three are investing heavily in IT-supported process changes they hope will help them regain their standing as high-performance corporate leaders.

By David Freedman

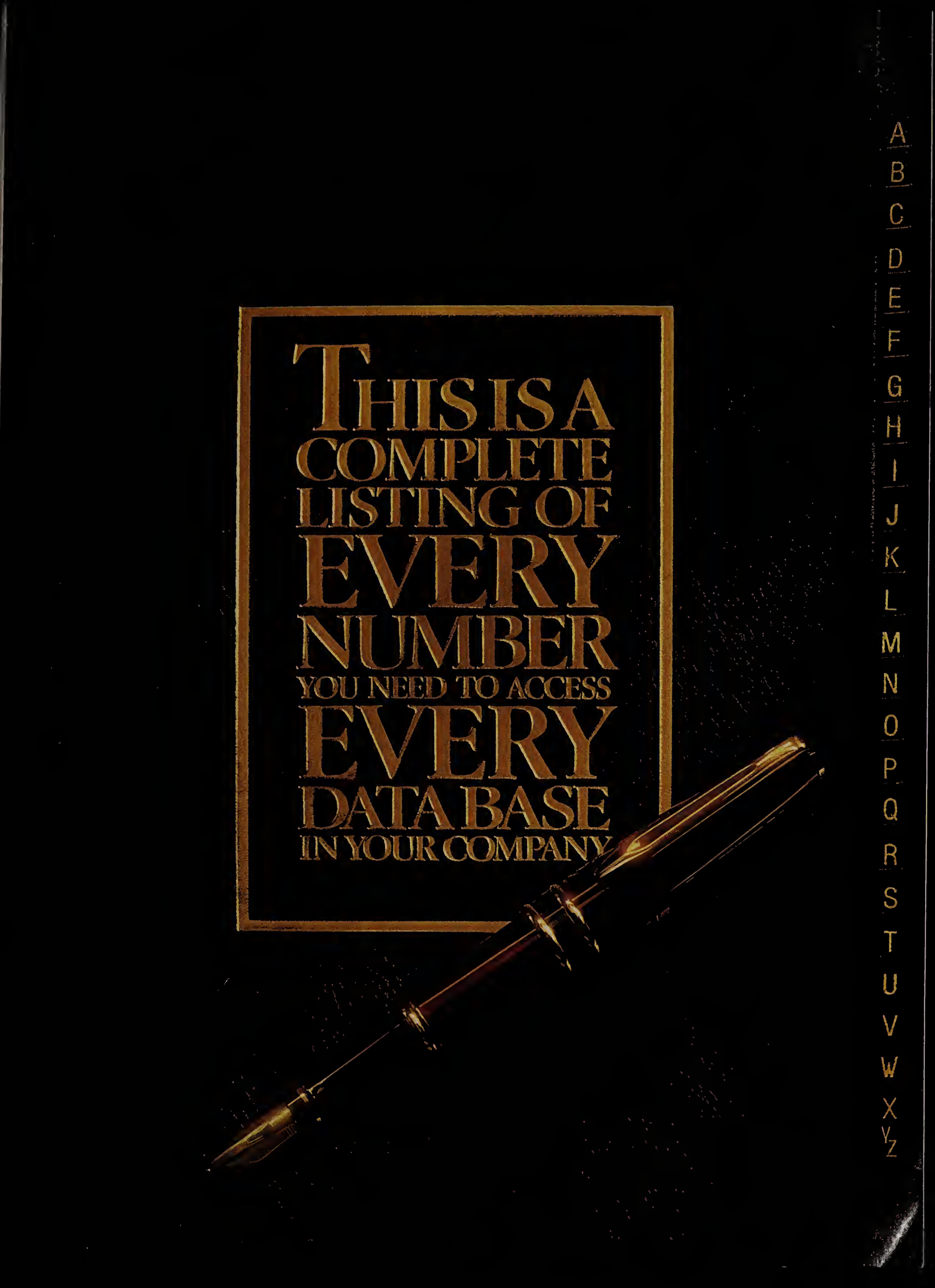
Hard times, hard sell **30**

Open-Ended Efforts 55

By getting even limited numbers of vendors to work together, and by encouraging users to make known their needs, the various open systems organizations are moving the standards-setting process along. Still, a journey of a thousand miles remains a pretty long trip....

By Megan Santosus

MORE ▶▶▶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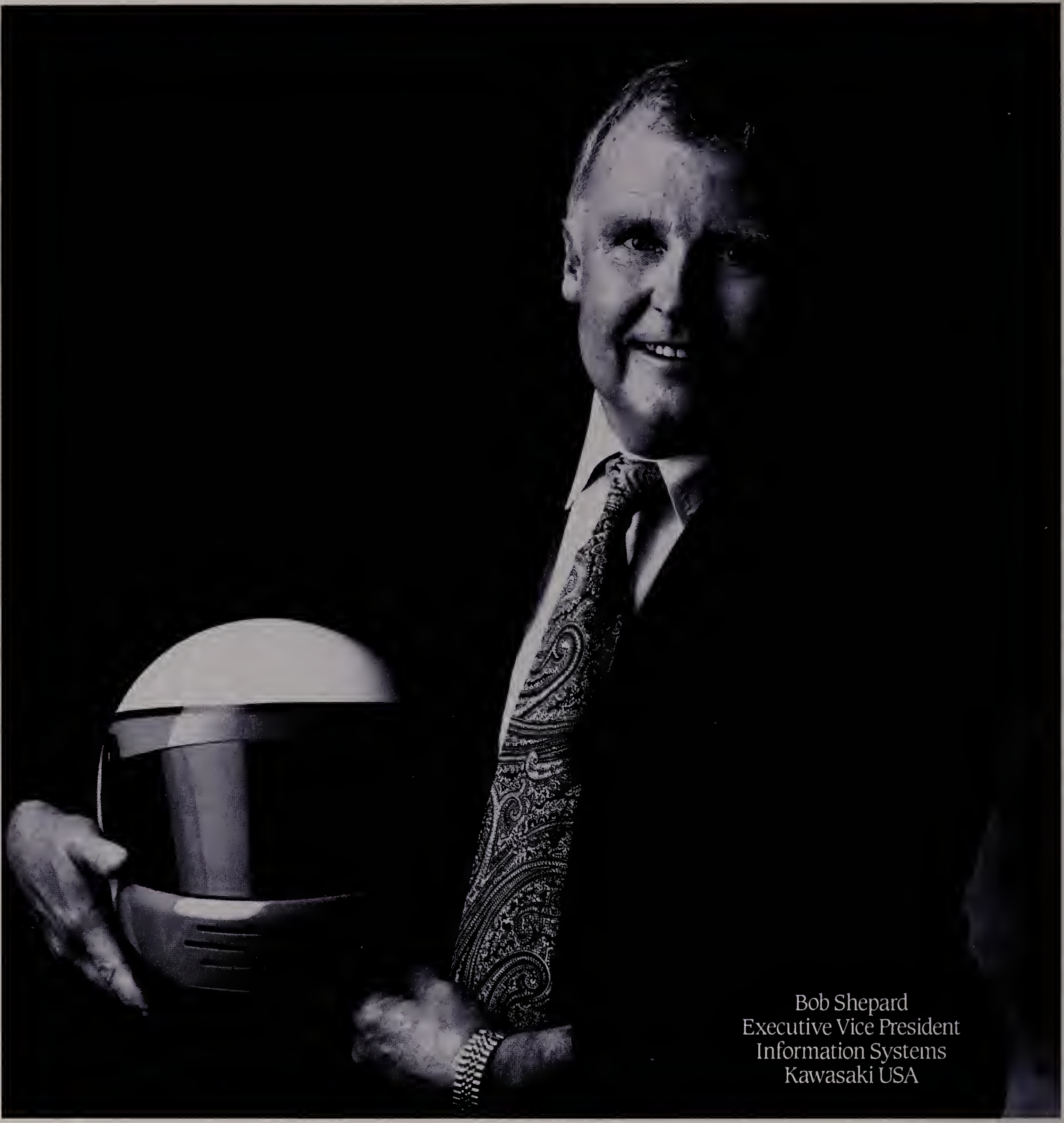

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COLUMNS

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Industry's use of CIM has fallen far short of the promise held out by early proponents. But now that some barriers are starting to dissolve, CIM is reemerging as a smart business strategy.
By Joel A. Schnur

STATE OF THE ART: MAKE ROOM FOR DASD 62

These days the challenge in data storage is not to expand the envelope, but to shrink it—while at the same time stuffing a lot more inside and at ridiculously lower costs. Redundant arrays are hot. Intelligent controllers are key. Bacterial, 3-D and holographic storage technologies are simmering in the lab. . . . Who would have thought storage could be so cool?
By Kathleen Melymuka

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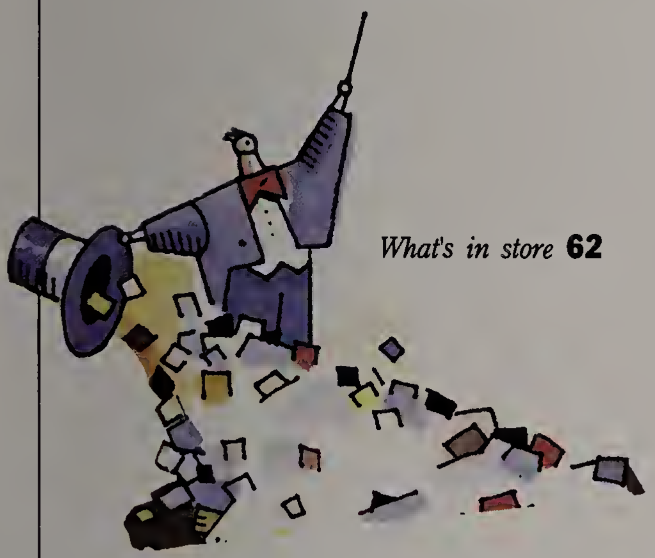

What's in store **62**

WORKING SMART: WASTE NOT, WANT NOT 72

When a federal systems integrator reengineered its business activities and the systems that support them, it wrung extra value from the process by marketing its method to clients and converting its discarded mainframe into a service bureau/hot site.
By Megan Santosus

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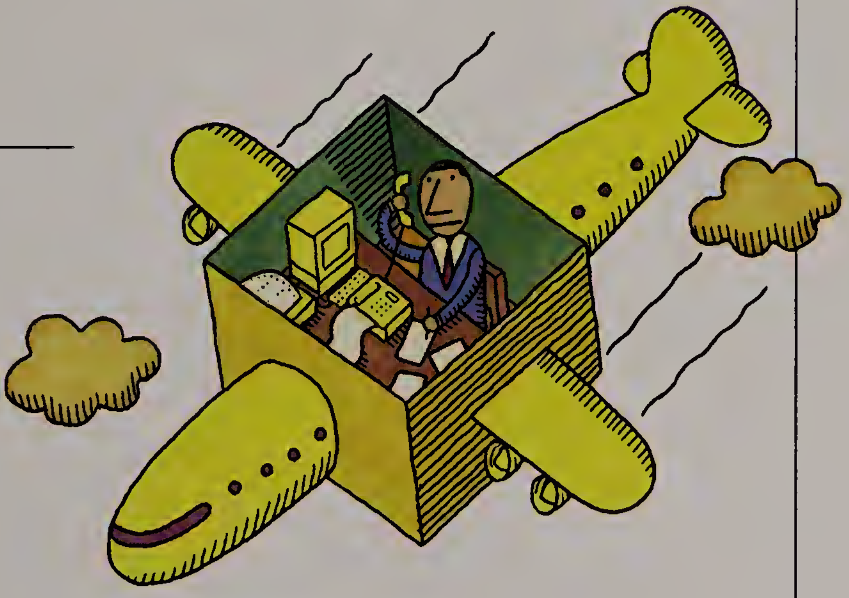

Office in the clouds **16**

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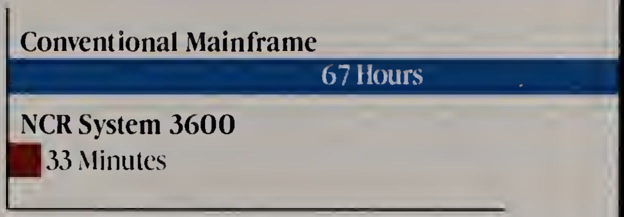

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A major challenge on the CIO's critical-issues list is forging alliances—both with internal customers and with executives throughout the enterprise. Managing the buy-in for IS requires delicate relationship-building skills.

The process of creating alliances is explored in two articles in this issue. For Walt Coleman, vice president of consumer services operations at Whirlpool Corp., learning the intricacies of IT was a hard-fought battle. Contributing Writer Lucie Juneau, in her story "The Education of a Line Manager," beginning on Page 38, details Coleman's harrowing initiation into this new and sometimes unpredictable arena and his ensuing recognition of the need to partner with IS.

The impetus for this alliance was a systems-integration project that went awry. In the process of creating a customer-service hot line, Coleman learned some tough lessons, including the fact that there is a tradeoff between technical elegance and utility, and that non-technical executives run the risk of being shielded from essential technical details.

Fortunately, Coleman was able to partner with Rich Koeller, Whirlpool's vice president of information technology. The experience taught him that drawing on the expertise of IS professionals doesn't mean having to relinquish control of a system that enhances a department's operation.

Coleman's experience has the hallmark of a war story that will be told for some time to come. Also facing a formidable challenge, although under somewhat less-trying circumstances, are IS executives attempting to market their services to potential users within the organization. Laboring under tight budgets and the threat of outsourcing, CIOs are under pressure to ensure that user departments understand the value of technology and want to buy IS services from the internal provider. In "Birth of a Salesman" (beginning on Page 30), Senior Writer Meghan O'Leary reports on the experiences of CIOs who have developed winning techniques for marketing information systems.

The impact of IT on the human side of the enterprise presents a sometimes treacherous terrain that the information executive must navigate. Learning new methods for successfully gaining the confidence of various constituencies is key to the CIO's success.

Marcia Blumenthal

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LETTER FROM THE PUBLISHER

> *"On the surface, people think open systems is pretty logical. But when you start to sell it to end users, the concepts aren't so easy to understand."*
>
> *—Augie Nevolo*
> *Chairman*
> *User Alliance for Open Systems*
> *Corporation for Open Systems*

The move toward open systems has created an infrastructure of organized standards initiatives across the country and around the world. Regardless of the technology issues they deal with, these consortia share the goal of establishing a common framework from which vendors developing open systems solutions, and customers who must implement them, can proceed.

It's no secret that IT companies offering open systems solutions need to stay abreast of the key standards initiatives relevant to their business. Active participation in one or more of these groups can yield important benefits.

Vendors who participate in open systems organizations are exposed to the latest thinking on various standards alternatives. They also work hand-in-hand with customers, and thus can learn a great deal about customers' business problems and technology concerns. Most important, however, these vendors can help to shape the guidelines that will govern product development and delivery in the future.

IT vendors must take a lead role in charting future standards. But I'd also like to see them help educate my customers—CIOs—on the value and business benefits of those standards. What do they mean? Why are they necessary? Why should the CIO care? Why should a company adopt one standard over another? How and when will standardization help to make open systems implementation a reality?

These are the types of questions with which CIOs struggle in their efforts to select enterprisewide technology standards and the open systems solutions that exploit them. Those who can help provide answers, through such forums as *CIO* magazine, will be providing an invaluable service.

P.S. Please join us at the next CIO Perspectives conference, "The Process of IT: Organizing for Success," Oct. 11-14 at the Boca Raton Resort & Club in Boca Raton, Fla. For more information, please call 800 366-0246.

PHOTO BY GEORGE SIMIAN

Coming In CIO

Strategic Outlook: Measuring IT's ROI

Traditional financial measures are poor yardsticks for the intangible costs and benefits of IT, but technology boosters can offer little hard evidence to support the strategic value of their pet projects. What CIOs need are concrete measures they can use to estimate the value of technology, stemming from the strategic goals of the organization and the palpable business needs of customers. *CIO* explores several emerging methodologies that address this new vision of value.

A Mature User

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At Drew University in Madison, N.J., every student and faculty member has a networked computer; E-mail is as commonplace as English 101; and graduates find that the job market is a friendlier place thanks to the school's insistence on computer literacy.

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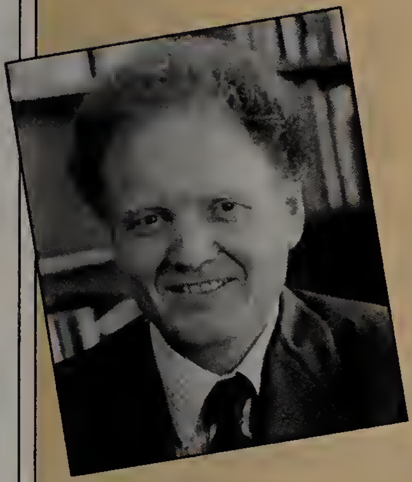
The Process of IT: Organizing for Success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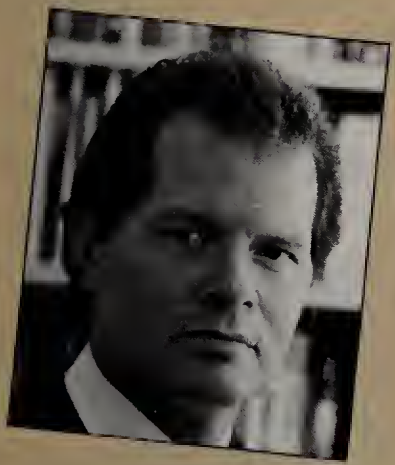
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>
> *Bob Kantor*
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ORGANIZATIONS

BACK SUPPORT FOR BENCHMARKERS

Benchmarking is essentially an act of humility. It encourages companies to contrast their internal processes (distribution, customer service, the delivery of new IT applications) against the best examples in business today, forcing the overweight, gimpy, stoop-shouldered and homely to stack themselves up against the fit and handsome. That can be tough on the ego.

It can also be an illuminating experience. When done correctly, benchmarking provides insights for improving performance. Now there is an organization that would like to aid companies humble enough to bow their heads and learn from the masters. The International Benchmarking Clearinghouse, a division of the Houston-based American Productivity and Quality Center, offers benchmarking training and information services to member companies.

The Center, a non-profit organization concerned with quality and productivity, realized more than a year ago that interest in benchmarking was waxing, but information on the topic was fragmented. Too bad: It is often difficult and expensive for a company to map out a strategy for benchmarking the right processes in the right way; and seeking out examples of the best-of-class for any given business process can be an arduous task. Moreover, benchmarking requires a well-managed relationship between the superhero and the wannabe—and companies need information on how best to set up such alliances.

Working for nearly a year with a number of member companies (including several winners of the Baldrige award), the Center designed the Clearinghouse as a centralized source for benchmarking information and services—including metrics and a database of top-notch companies in a variety of practices. The new division will also provide training seminars and consulting services, facilitate networking among benchmarkers and experts, and provide an abundance of publications, directories and videos. The organization could benefit not only the greenhorns but also the best-of-breed, who are deluged with requests to dance the benchmarking tango.

The Clearinghouse already boasts more than 50 members, including eight founding companies (AT&T, IBM, Hewlett-Packard, Arthur Andersen and Price Waterhouse among them). Annual membership fees are $6,000, and there is an initial fee ranging from $3,000 to $12,500 depending upon the company's size. For further information contact the International Benchmarking Clearinghouse at 713 685-4666. ■

SPIES LIKE US

Every era gets the spies it deserves. The Cold War games of George Smiley and his real-life counterparts seem anachronistic now that economic anxiety has overshadowed political concerns. Today the focus of intelligence-gathering operations has shifted to the business arena, where corporate spying has become such an established management specialty that its practitioners have their own professional organization.

The Society of Competitive Information Professionals (SCIP) has been around for six years. Its 1,600 members are people "whose job it is to gather and analyze information about competing companies," according to SCIP. The CIP's mission—if he or she decides to accept it—is to use whatever *legal* means are available to collect information, frequently of the inside variety, that will help his or her company succeed in the marketplace.

All this is probably a lot less sexy than it sounds. But while SCIP's most recent conference program contained its share of unremarkable-sounding topics ("Growth Rate Analysis"; "Benchmarking: A Natural Progression Beyond Competitive Analysis"), there were also sessions on "Competitive Wargaming" and "Trade Secrets in Foreign Business Transactions."

SCIP's goal is "to have competitive intelligence recognized as necessary to gain a competitive edge in business and industry today." And it provides a place for its members to go when they come in from the cold. ■

THE TECHNOLOGY PRESIDENT?

The advent of interactive television may make fat, lazy Americans even fatter and lazier. But it may also make them better citizens, according to the Businessman Who Would Be President, H. Ross Perot.

Interactive television would allow viewers to shop, rate videos and even do their banking without leaving the couch. Ironically, the same technology that encourages physical inaction enables political action, according to Perot, who envisions the creation of "an electronic town hall" where "[politicians] explain [issues] in great detail" and viewers "can send a laser-like signal to every congressman in Washington about what you want to say as a way of clearing heads."

In an address to the National Press Club, the chief executive of Perot Systems Corp. (and founder of EDS) pressed for empowerment through technology. When voters can make their opinions known to their representatives through interactive TV they will "just [go right] around the special interests," he said.

Paperless tax returns, already undergoing a trial by the IRS, are also being touted by Perot. "This is nothing more interesting than running several different computer models," he said, ". . . and marching forward with a new tax system that works."

Five months before the general election, George Bush and Bill Clinton may already have lost the techno-nerd vote. ■

ILLUSTRATION BY FRAN O'NEILL

Haunted By Project Management Nightmares?

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TRENDLINES

IN-FLIGHT NETWORKING

THE SKY'S NO LONGER THE LIMIT

The concept of the mobile office is reaching new heights—literally.

A new, all-digital, air-to-ground network system promises to let airline passengers keep their noses to the grindstone by providing telephone, fax and E-mail services. Using armrest-installed telephones and Turbo XT-based PCs at each seat, passengers can send and receive faxes and E-mail messages, access news and stock market information, make car and hotel reservations—even play electronic games. Laptops can be plugged into the network through local data ports.

Systems design, engineering and software applications for the new network were developed by DeskTalk Systems Inc., a systems-integration company based in Torrance, Calif. In-Flight Phone Corp., of Oak Brook, Ill., will use the network to provide a variety of telecommunications services to airlines.

In designing the integrated voice and data network, DeskTalk faced a variety of challenges, such as making efficient use of bandwidth within the constraints of an aircraft cabin and providing the capacity to support peak user demand. The company resolved the first problem by adopting a client/server architecture for data transactions that reserves air-to-ground bandwidth for voice and high-speed data communications. To handle peak usage, DeskTalk implemented a "polled" solution in which the cabin server recognizes each passenger on the network in cyclical intervals of a few seconds.

The ground system consists of a data operations center and more than 80 base stations throughout the United States. Each base station is controlled by a '386 DOS-based server. DeskTalk designed the ground system to connect to other systems such as an SNA host at an airline or a link over an X.25 network to a service provider.

According to the integrator, the network will support new services and incorporate emerging technologies because it is based on industry standards such as Ethernet, TCP/IP and Unix, and off-the-shelf terminal servers and modems.

In-Flight first offered the services to USAir on a limited basis in April. If passengers take to the technology, telephones and PCs may soon be as commonplace on planes as salted peanuts. ■

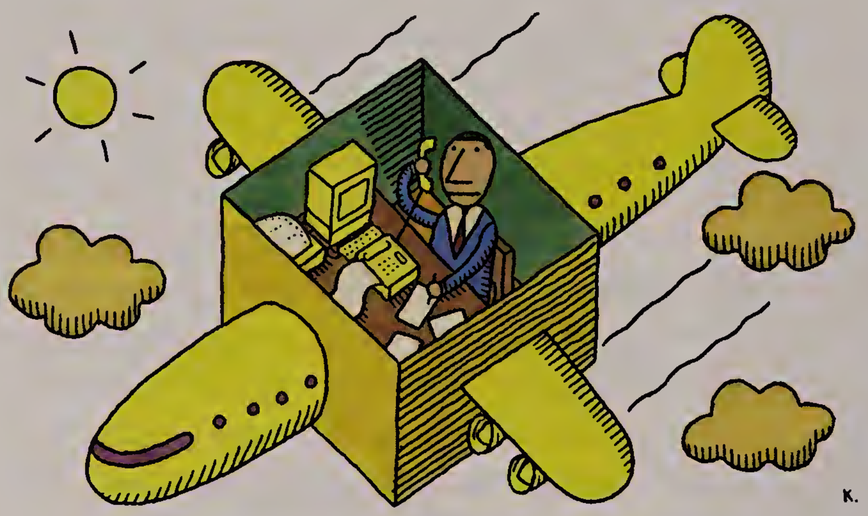

ILLUSTRATION BY JAMES KACZMAN

COURT NOISE COMPLAINT

Shakespeare's lack of fondness for lawyers is well known—"First thing we do, let's kill all the lawyers." (See also Dickens' masterpiece, *Bleak House*.) Less well known is an apparently growing practice among some businesses to curb the dogs of litigation.

The cover story in the April 13 *BusinessWeek* examined what the magazine called "an unprecedented rethinking of the U.S. civil justice system." Rethinking seems to be in order: A graphic accompanying the article indicates that there are 307.4 attorneys for every 100,000 Americans; in Japan (whose executives are openly contemptuous of the systemic sludge that afflicts the United States from all those *juris doctor* degrees) the number is a paltry 12.1.

These days lawyers are like any system that adds complexity and cost without also adding clear value: They are ripe for downsizing. The article gave the example of Motorola, which has cut its litigation costs by as much as 75 percent by resorting to a variety of dispute-resolution alternatives, such as arbitration, mediation and the use of private judges. The goal is to stay out of court. If they fail, Motorola's attorneys must fill out a complex form requesting permission to go to trial. The article quoted Motorola General Counsel Richard H. Weise saying that the form is "so onerous that [lawyers] gladly work out an alternative settlement."

The article gives plenty of statistical support to the notion that runaway litigation threatens U.S. companies' international competitiveness while draining productivity and profits; but only in the closing paragraph is there mention of the importance of making sure that moves to reform don't also weaken individual rights. ■

TAKE THIS JOB AND FILL IT

Looking for a few good men, or women, to fill IS positions? Or are you one of the many victims of "rightsizing" who has yet to find a new job? In either case, you can call on MIS Network Associates, a group of unemployed IS professionals that meets weekly to share job leads and develop contacts. Employers can submit information on openings to the group, and in return they'll receive resumes of members who match the qualification criteria. What's more, it's all free; the employer pays no fee even if it hires the referral. A little over a year old, MIS Network Associates has 200 members based primarily in the metropolitan New York area. So far it has helped place 65 members in IS jobs nationwide. Employers wishing information should contact the association's chairman, Ralph Richardson, at 201 335-0240. ■

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TRENDLINES

POLLUTION CONTROL

TRACKING THE STACKS

The only thing murkier than the skies over Southern California may be the methods used to attack industrial emissions. This growing problem has spurred the regional pollution-control authority to redirect its efforts and bring technology to bear in the battle against air pollution.

The South Coast Air Quality Management District in Los Angeles plans to change the way it regulates polluting industries next year. Instead of setting operational policies for companies to follow, the organization will require businesses to measure their own emissions and share that information with the state.

Emissions monitoring will take two forms under the new regulations. For nitrous oxides given off by burning fuels, companies must install sensing devices in or near the smokestack that measure emissions in real time. The sensors would relay emissions figures to an on-site terminal, which would then send the data directly to the regulatory agency's computer. (Current emissions monitoring relies on on-site audits by regulators.)

Emissions of reactive organic gases, such as those given off by paints and solvents used by manufacturers, will be monitored less directly under the new regulations. Companies will record their use of such products by scanning bar codes on each container of paint or solvent. This information would be sent via phone lines to the agency, which would estimate the level of emissions based on the amount of chemicals used.

While current users of the smokestack-mounted sensing technology must regularly test and adjust the devices in order to ensure their accuracy, manufacturers of the equipment are working to ruggedize it for the factory environment while making it more sensitive to low-level emissions.

To date, 100 companies in Southern California are using or testing the smokestack-sensor technology, and the authority expects it will be phased in by 600 other companies soon.

While technology may provide more accurate tracking of emmisions, it can't ensure that all companies will reduce their pollution levels. So the new regulatory approach will allow companies that can't meet emissions standards to purchase pollution rights—sort of a Get Out of Jail Free card—from companies that exceed the requirements. ▬

ILLUSTRATION BY JAMES KACZMAN

KVETCHWARE

Fighting city hall, and other bureaucratic sinkholes, can be a daunting proposition. You're constantly talking to the wrong people, and the thing they turn out to be best at is diverting you to more of the wrong people.

Parsons Technology, of Hiawatha, Iowa, has introduced a $69 software product that the company claims will help consumers conduct more-successful and more-satisfying transactions with the powers that be.

The product, called Personal Advocate, includes forms for 40 of the letters most frequently written to credit, consumer and government organizations. These can be sent as is or adapted by the user. It also comes with a list of addresses and phone numbers for some 2,500 contacts within corporations, consumer groups and Better Business Bureaus, and offices of attorneys general.

According to Parsons' press release, Personal Advocate was "designed in conjunction with a team of attorneys," a marketing message that on reflection has kind of a frightening ring to it.

Aggrieved and frustrated consumers can reach Parsons at 800 223-6925. ▬

FROM POST MASTER TO TRAVEL BROKER

The U.S. Postal Service is continuing to co-opt the participation of businesses in handling large-volume mail deliveries by giving them the ability to book their own airmail flights for trays of mail.

STARSHIP is in effect a post-office CRS for airlines contracted to carry mail in the United States. STARPORT, an automated mail-dispatching system from Pitney Bowes' Production Mail Systems division, lets mailers access the STARSHIP system and book the flights themselves. Once a booking is made, the mail is delivered directly to the airport, without post-office participation.

Using a standard PC running Microsoft Windows, a mailroom employee places a finished tray of mail on a scale and scans its tag, capturing the destination, ZIP code, and the contents and weight of the tray. This information is transmitted by modem over a standard phone line to the STARSHIP system, which locates the next available flight and conditionally books the tray on it in less than a second.

STARSHIP transmits the booking back to the user site, where a destination and routing label is printed. The label is attached to the tray and scanned, and the host system confirms the booking.

In pilot implementations, the new system has helped get mail in the air eight to 18 hours sooner. However, there are no special perks for first-class mail. ▬

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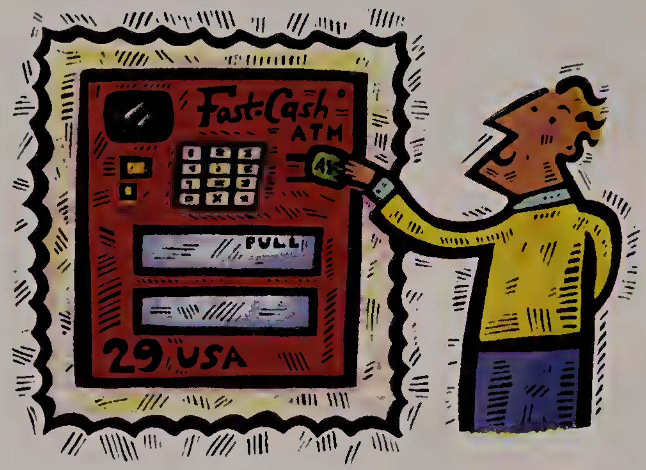
TRENDLINES

A New Outpost for Postage

Your local ATM may soon be rolling out more than crisp bills if an Ohio bank's recent action proves to be trendsetting. Through August, the Huntington National Bank of Columbus will distribute U.S. postage stamps through 10 ATMs located throughout the city. If the trial is successful, The Huntington plans to expand the program to its statewide ATM network.

The U.S. Postal Service has developed ATM stamp "sheetlets," which are the same size and thickness as dollar bills. The sheetlets contain 18 self-adhesive, humidity-resistant 29-cent stamps.

The procedure for buying stamps is similar to making a cash withdrawal. Customers can purchase up to 54 stamps in a single transaction, with the amount automatically deducted from their accounts.



"This is a logical extension of ATM functionality," said Paul Ayres, vice president of The Huntington's Electronic Delivery Systems. "It promotes further acceptance of ATMs as more than just cash dispensers."

With BayBanks using a similar system in Boston, it looks as though the shift away from long lines at the post office has already begun. The system's only obvious drawback is that it limits freedom of choice. Customers who prefer the Elvis stamp over a more traditional wildfowl design are out of luck.

The Young and the Networked

Ask a class of second graders what they want to be when they grow up, and you'll hear "police officer" and "astronaut" a whole lot more than "information professional." But the IS workforce of the future is being educated in the elementary schools of the present, and it pays for businesses to invest in that education.

Toward that end, SIM is sponsoring a drive to form partnerships among business, higher education and the K-12 community. The partnerships are intended to promote collaboration across local and state boundaries and enable teachers and students to share applications and access such resources as library catalogs, discussion groups and special-interest databases.

Seven schools in Massachusetts are looking for partners to provide skills, technical support and/or equipment. If you are interested in working with these schools, or adopting another school, contact Melanie Goldman at Harvard University, 617 495-8862.

BUSINESS SYMPOSIUM

Predictions with a Pedigree

A formidable trio of futurists from academia and business gathered at Harvard recently to forecast the fates of business and society. The forum, Data General Corp.'s first Business Symposium, brought together Lester Thurow, renowned economist and Dean of MIT's Sloan School of Management; John Naisbitt, best-selling author of *Megatrends* and *Megatrends 2000*; and Stan Davis, former Harvard professor, business journalist and author of *2020 Vision.* Here are some of their thoughts:

- Distribution and delivery will replace productivity, quality and customer service as the pillars of business in the 1990s. Manufacturing will move closer to the point of sale, allowing companies to operate in a world of zero-based inventory.
- The world is moving toward a single global economy and market. Meanwhile Europe, with the world's biggest economy, will write the rules of trade, and the United States will have to obey them.
- The current seven-decade, post-industrial economy will end by the year 2020 and be replaced by a biotechnology-based economy.
- In the next 50 years, the battle between communism and capitalism will be replaced by a capitalism-versus-capitalism conflict pitting the United States against Europe and Japan.
- Just as transportation technology gave rise to suburban migration, information and transmission technology will give rise to an increased migration back to rural communities by the nation's white-collar workforce.
- The arts are supplanting sports for the first time as the nation's dominant leisure interest, spurred by the ascendancy of working women, many of whom prefer museums and the symphony over basketball and hockey.
- The most dire challenge the country faces is improving secondary education. Only the corporate sector has sufficient credibility to force these improvements, perhaps by designating the best secondary schools as preferred suppliers of employees.

The Last Laugh

Good things come to those who wait. Last issue we announced the winner of the *CIO* Joke Search and also decried the overall quality of entries we received. Sure, there were a few mildly amusing stories, but no real knee-slappers—and a lot of the entries were downright unfunny.

But after the contest had closed, one last straggler made its way into our offices. And got a laugh. On a single sheet torn from a company notepad, the reader had scrawled, "My CIO is a joke. Can I send him to you?"

The guy actually included his name and the name of his company, which we are withholding in what we perceive to be his best interests. We'll be happy to send a mug—to his home address.

ILLUSTRATION BY FRAN O'NEILL

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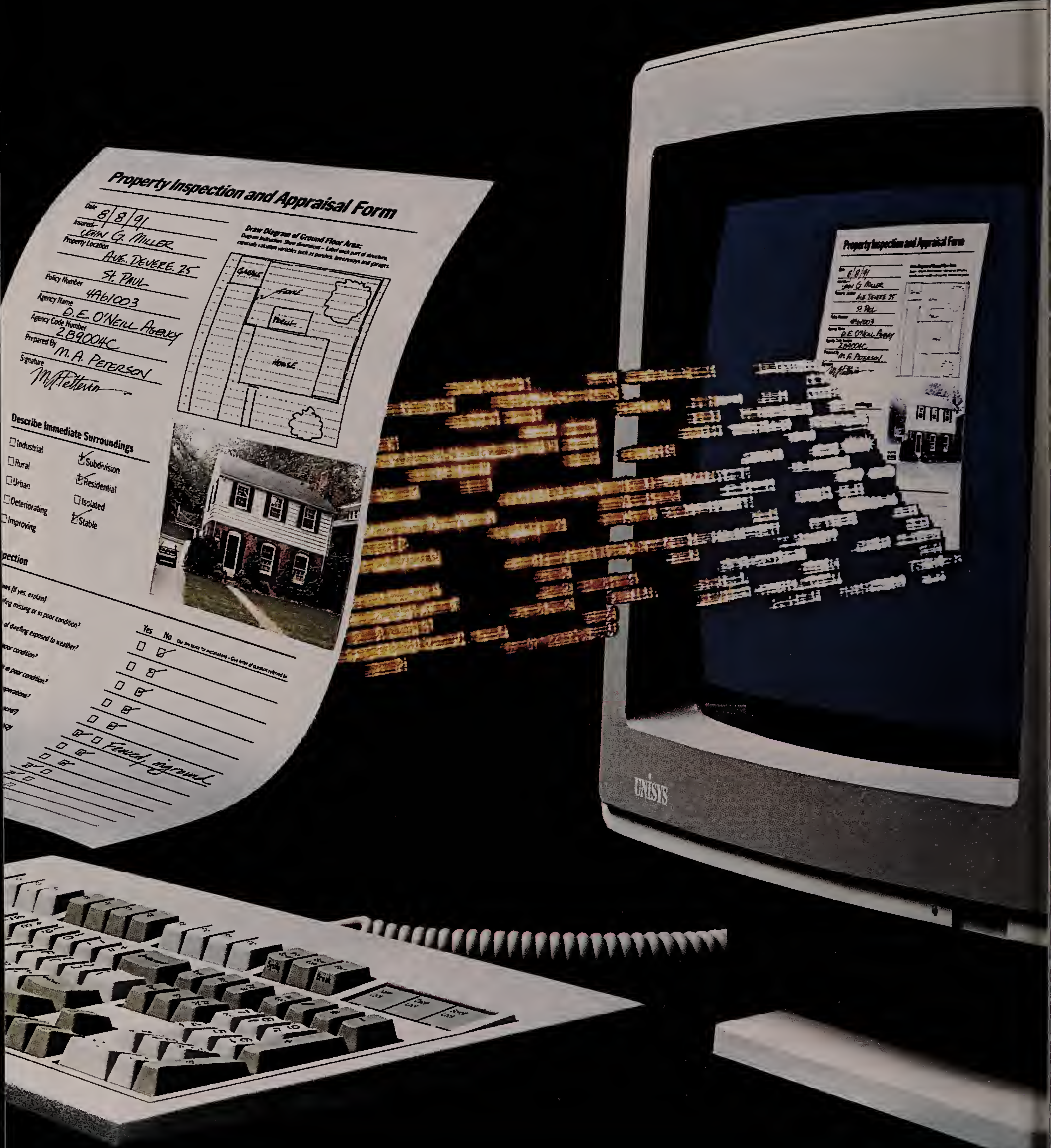

Property Inspection and Appraisal Form

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Policy Number 4A61003

Agency Name O.E. O'NEILL AGENCY

Agency Code Number 2B9004C

Prepared By M. A. PETERSON

Signature M.A. Peterson

Draw Diagram of Ground Floor Area:
Diagram Instruction: Show dimensions – Label each part of structure, especially valuation variables such as porches, breezeways and garages.

Describe Immediate Surroundings

☐ Industrial
☐ Rural
☐ Urban
☐ Deteriorating
☐ Improving
☑ Subdivision
☑ Residential
☐ Isolated
☑ Stable

pection

es (If yes, explain)
fing missing or in poor condition?
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Keeping the Faith

Industry's use of CIM has fallen far short of the promise held out by early proponents. But now that some barriers are starting to dissolve, CIM is reemerging as a smart business strategy.

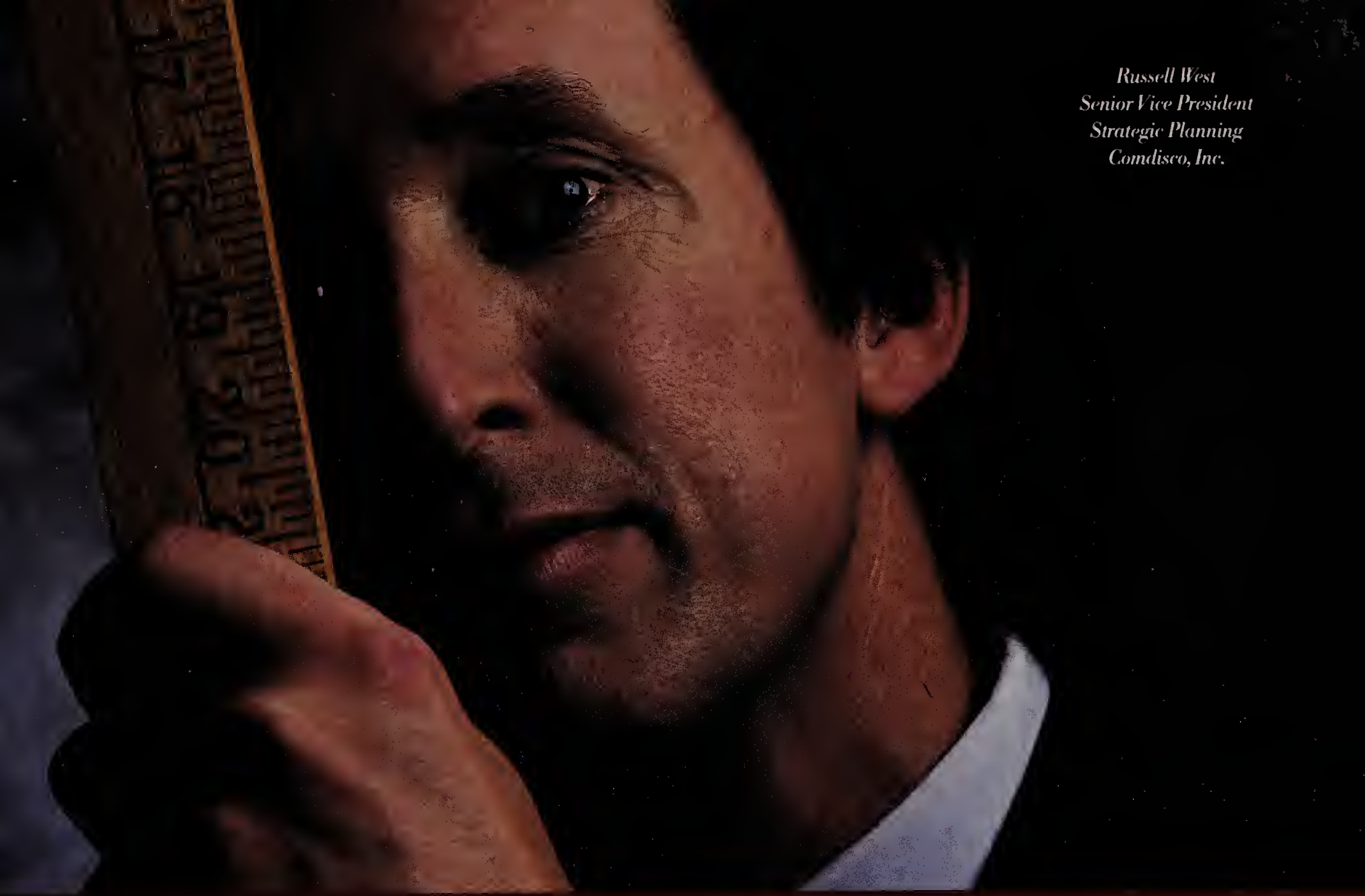
BY JOEL A. SCHNUR

A funny thing happened to Computer Integrated Manufacturing (CIM) on the way to industrial utopia. After throwing all sorts of technological innovations at the factory floor, manufacturers have come up competitively short in many crucial market segments. They have employed robots, automated storage-and-retrieval systems, Manufacturing Requirements Planning (that's old MRP), Manufacturing Resource Planning (that's newer MRP, a.k.a. MRP II) and Flexible Manufacturing Systems (FMS). They have invested heavily in these and other innovations, but what happened to the payoff? True, there have been many success stories; but far too many CIM projects have failed to make a positive impact on the company's balance sheet.

Joe Harrington, in his classic 1973 book, *Computer Integrated Manufacturing*, envisioned a well-integrated enterprise that successfully employed computer systems and applications to produce finely tuned manufacturing operations. Keep in mind that at the time, the computer industry was still in its infancy and computer illiteracy was widespread. Well, Harrington's vision caught the attention of many large organizations, in both the public and private sectors. The U.S. Air Force, for example, was clamoring for a way to speed the responsiveness of manufacturing operations in order to meet Department of Defense schedules. The government needed CIM regardless of cost.

Today, companies can be grateful for the tremendous strides that were made during that era, including such productivity improvements as the widespread use of APT (Automatically Programmed Tools), a numerical control language; IDEF (I-CAM Definition Language), a methodology for modeling manufacturing functions; and group technology, a technique for classifying and coding products and processes. As these technologies developed, more companies jumped on the bandwagon. Results were promising, hopes were high, and visions sprang up of lights-out and paperless factories. Unfortunately, at many of today's factories the lights are out for different reasons. Industry has fallen far short of Harrington's vision.

Still, there are good reasons to maintain faith in CIM, for industry is truly in the midst of a paradigm shift. Until recently, CIM has suffered from technological, process-integration and human problems. Today these problems are all being overcome. First off, technology is no longer an inhibitor: The evolution



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and robustness of currently available off-the-shelf platforms have surpassed anything envisioned in the Harrington era. In fact, with advances in chip sets and client/server architecture, technology has become a driving force for CIM.

Companies are also much wiser about processes and how they interact with and contribute to the big picture. The cliche, "simplify, automate, integrate," has taken on dramatically new meaning. Manufacturing units, as well as IS departments, now have access to software tools that, for example, allow them to model manufacturing activities and information flows as they would function in the ideal factory. "Hands-on" workers share in creating these models. Their knowledge is sought and captured, making them part of the solution rather than part of the problem. Hence, the models represent a worker-informed infrastructure for the implementation of CIM. These tools are far from perfect, but they do convey a game plan that all of the players can follow, greatly enhancing the integration aspects of CIM. Process modeling will make vast inroads in the quest for improved, flexible factory operations.

Dealing with the human issues has always been the toughest challenge when change occurs. But even in this area there exists a paradigm shift. Cross-functional teaming is at the forefront of today's organizational thinking. The leaner, meaner, flatter organization of the '90s will be largely based on a cooperative, well-informed, task-sharing workgroup. Organizational barriers will give way to teams of specialists who join in attacking a common set of problems and who collectively share in the rewards of their efforts. That seems to be an excellent formula for dealing with the complexities of CIM.

Although the major barriers to CIM success are dissolving rapidly, some new obstacles have appeared. One of the most formidable issues now facing industry is a lack of standards for product and process definition. Emerging world-class companies need reliable and uniform ways to define, manage and exchange product and process information among their divisions, subsidiaries, suppliers, partners and customers. This need goes light years beyond the basic capabilities of EDI.

Another emerging issue is manufacturing's ability to properly resolve environmental concerns. Manufacturing's effect on the world's ecological nightmare can no longer be brushed aside as an unfortunate but necessary byproduct of industrial activity. The CIM projects of this decade, both in Europe and the United States, are actively addressing such issues as an essential part of integrating the enterprise.

> *Manufacturing's effect on the world's ecological nightmare can no longer be brushed aside as an unfortunate but necessary byproduct of industrial activity.*

Although CIM earned a poor reputation in its early days, it is reemerging as a smart business strategy. The pressures for rapid speed to market, flexible reaction to customer needs, lower costs and immediate access to information are all key drivers of CIM's new prominence and respectability.

What companies that adopt CIM are saying is, We will harness all of the information necessary to correctly produce products and services that are consistent with the business plan. To do the right job and to do the job right, everyone involved must have access to integrated, consistent, accurate and timely information. Where else can that burden be placed but on the shoulders of CIM?

Several research projects conducted by Computer Aided Manufacturing International (CAM-I), a not-for-profit consortium based in Arlington, Texas, suggest that a more global view is already developing. For example, sponsors of CAM-I's Cost Management Program, which has extended the application of activity-based costing beyond the financial community onto the shop floor, have determined that process-by-process cost tradeoffs are essential for responsive decision-making in today's marketplace. For example, rapid process adjustments on the factory floor require an understanding of all related cost drivers and their effect on the ultimate product cost. That requires the development of new techniques for measuring performance.

The recent recognition of the importance of tying in the procurement community, a group that has had little or no involvement with CIM, could result in immediate supplier advantages, especially considering that materials are the largest cost-consumer in a manufacturing enterprise.

The information systems community must play a major role in this new endeavor of the Integrated Business. As the technological advances in software and hardware unfold, as networking becomes more rational, as client/server capabilities mature, as cross-functional teams clarify the factory processes, information specialists will be pressed to provide all of the essential information nutrients that cause the enterprise to flourish. CIO

Joel Schnur is manager of integrated resource management at Hughes Aircraft, Space and Communications Group in El Segundo, Calif., and chairman of the Board of Computer Aided Manufacturing International, a not-for-profit consortium based in Arlington, Texas.

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CIO
THE MAGAZINE FOR INFORMATION EXECUTIVES
JULY 1988
VOLUME TWO
NUMBER TEN

TRENDLINES

DON'T FORGET THE NAILS

For the weekend renovator unaccustomed to drawing up workable plans and estimating and selecting building materials for do-it-yourself projects, the Weyerhaeuser Co. is now offering one of the more interesting computer-based kiosk applications.

Weyerhaeuser's DesignCenter, which debuted recently in building-supply and home-center stores, automates the project design and estimating process. While the marketing aim is to boost sales and employee productivity at the retail outlet, the added value to the do-it-yourselfer is in time, money and aggravation saved.

The system is fast (10 to 15 minutes to design a deck) and accurate (providing exact materials costs). Currently the kiosks are programmed only for decks, but garages, shelving units and other projects will be added to the system soon.

To operate the kiosk, a store employee uses a simple trackball device to prompt the customer through the design. Customers can opt for a deck that is either attached to the house or not, anywhere from ground level to six feet high, with one level or two.

Once the dimensions are set, the customer chooses the type of decking and the direction it will run in. A variety of railing styles are offered, with different balusters and headers, depending on the customer's tastes and budget. The system automatically sets the correct joist, beam and support-post placement.

Finally, when the design is complete, the system displays a detailed, 3-D image that can be manipulated on screen to show any angle, top to bottom, right to left. Another prompt shows the cost of materials for the current design. Too expensive? Try a simpler baluster style or trim down the square footage—then compare the two designs and costs side by side.

When the customer chooses a final plan, the DesignCenter prints out a 3-D color depiction of it, along with construction details, an itemized materials list (with current prices) and a "how-to" booklet on basic deck construction. (These are usually available only with the purchase of the project.)

The DesignCenter, which has been nominated for the *Computerworld*/Smithsonian awards for technology innovation, is the product of Innovis Interactive Technologies, a subsidiary of Weyerhaeuser. The kiosk was created, said Innovis President Mark Lembersky, as "a way to provide a value-added [service] to retailers that would help improve the store's image and sales and, at the same time, deal with the shortage of skilled workers on the store floor." Lembersky called the kiosk "remarkably easy to use," and reported that "almost all salespeople become proficient in 15 minutes."

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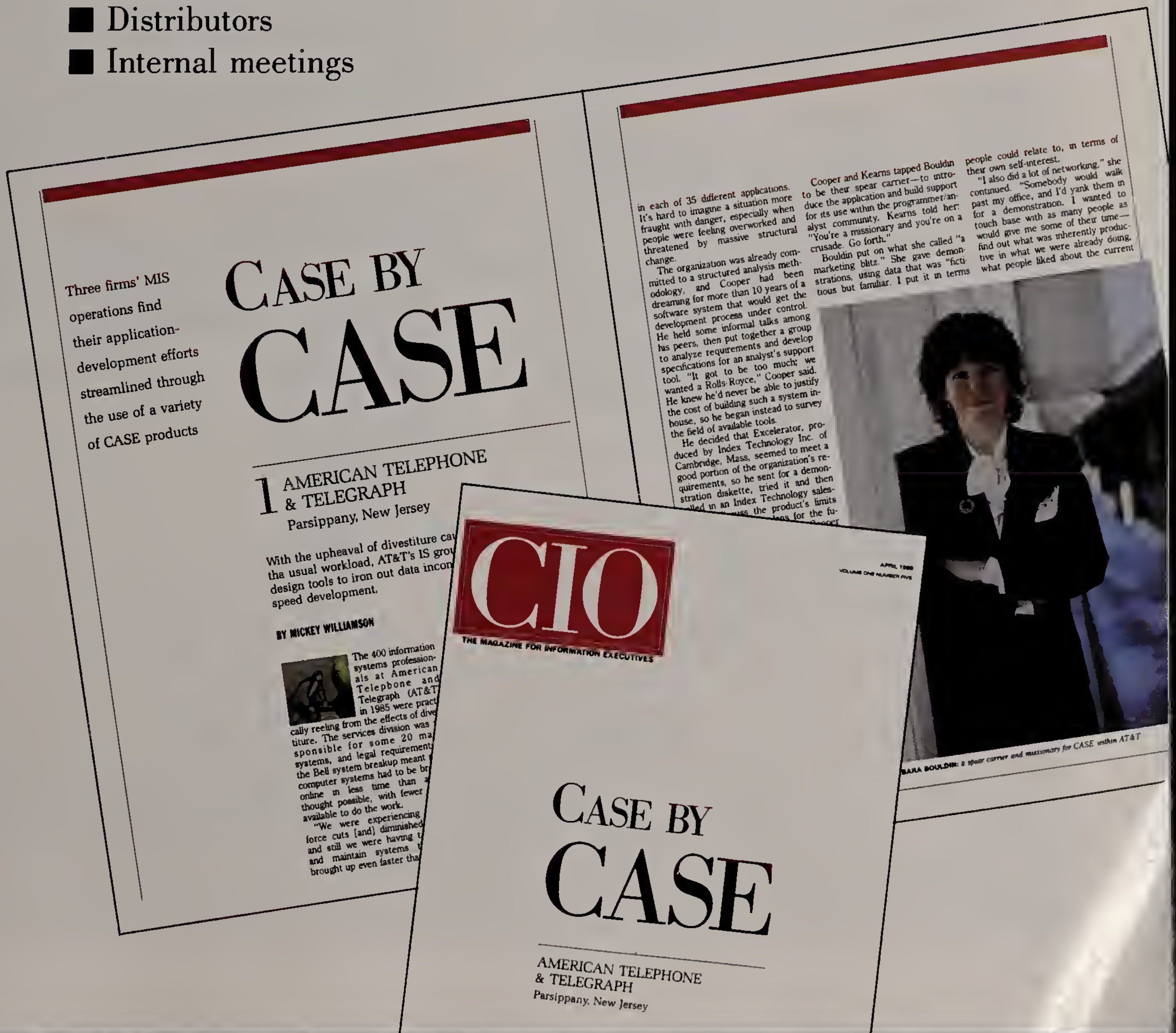

Three firms' MIS operations find their application-development efforts streamlined through the use of a variety of CASE products

CASE BY CASE

1 AMERICAN TELEPHONE & TELEGRAPH
Parsippany, New Jersey

With the upheaval of divestiture ca
tha usual workload, AT&T's IS grou
design tools to iron out data incon
speed development.

BY MICKEY WILLIAMSON

The 400 information
systems profession-
als at American
Telephone and
Telegraph (AT&T
in 1985 were pract
cally reeling from the effects of dive
titure. The services division was
sponsible for some 20 ma
systems, and legal requirement
the Bell system breakup meant
computer systems had to be br
online in less time than
thought possible, with fewer
available to do the work.
"We were experiencing
force cuts [and] diminished
and still we were having t
and maintain systems
brought up even faster tha

in each of 35 different applications. It's hard to imagine a situation more fraught with danger, especially when people were feeling overworked and threatened by massive structural change.

The organization was already committed to a structured analysis methodology, and Cooper had been dreaming for more than 10 years of a software system that would get the development process under control. He held some informal talks among his peers, then put together a group to analyze requirements and develop specifications for an analyst's support tool. "It got to be too much; we wanted a Rolls-Royce," Cooper said. He knew he'd never be able to justify the cost of building such a system in-house, so he began instead to survey the field of available tools.

He decided that Excelerator, produced by Index Technology Inc. of Cambridge, Mass, seemed to meet a good portion of the organization's requirements, so he sent for a demonstration diskette, tried it and then

Cooper and Kearns tapped Bouldin to be their spear carrier—to introduce the application and build support for its use within the programmer/analyst community. Kearns told her: "You're a missionary and you're on a crusade. Go forth."

Bouldin put on what she called "a marketing blitz." She gave demonstrations, using data that was "fictitious but familiar. I put it in terms people could relate to, in terms of their own self-interest.

"I also did a lot of networking," she continued. "Somebody would walk past my office, and I'd yank them in for a demonstration. I wanted to touch base with as many people as would give me some of their time—find out what was inherently productive in what we were already doing, what people liked about the current

BARA BOULDIN: *a spear carrier and missionary for CASE within AT&T*

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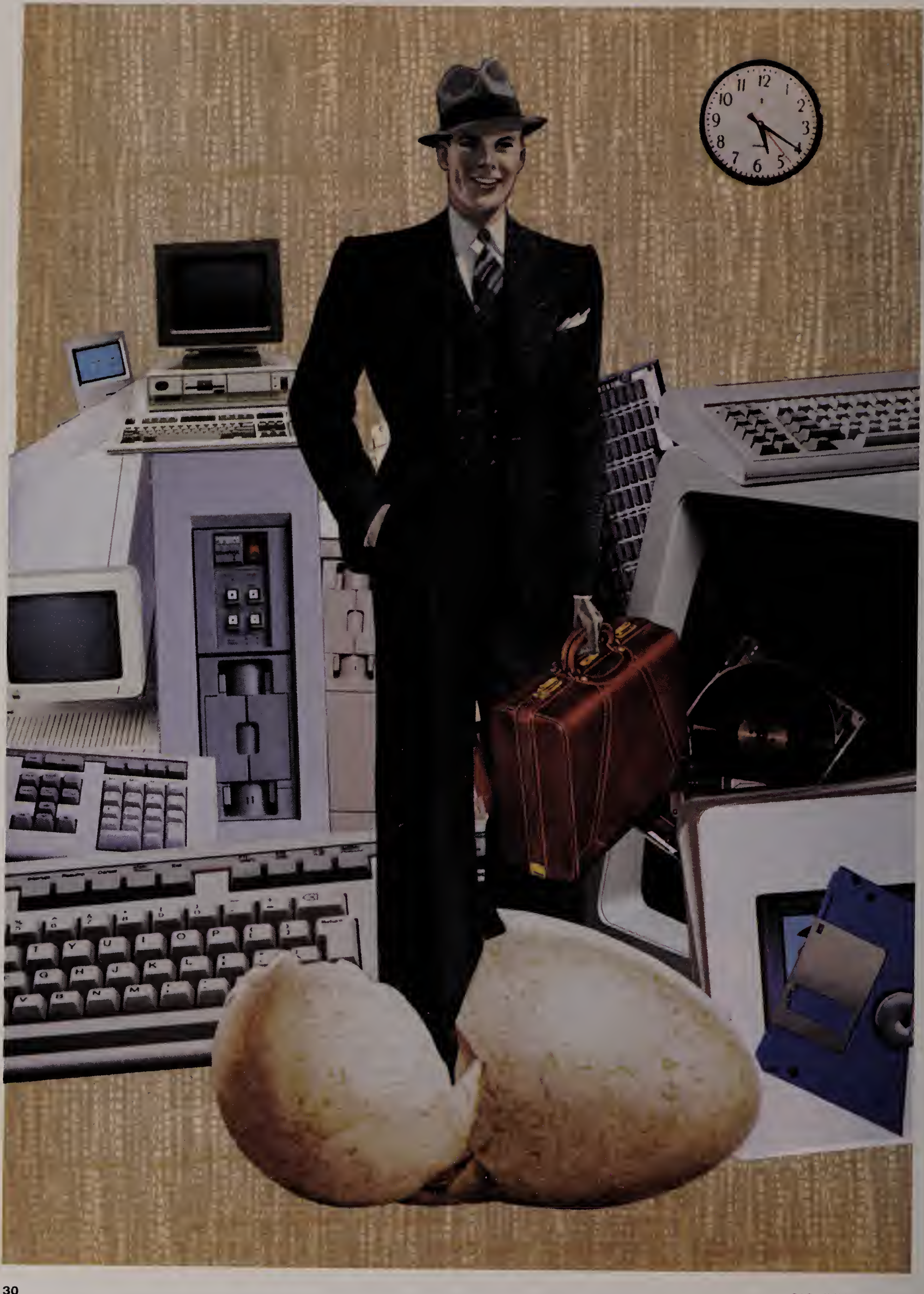

BIRTH OF A SALESMAN

Budgets are down, external competition is up, and once-complacent CIOs are scrambling for ways to sell their services to a no-longer-captive audience

JOHN B. FOY KNOWS THE END OF A FREE RIDE WHEN HE sees one. As the new senior vice president of information systems and services at the New York Life Insurance Co., Foy is stoic about the fact that the national recession and his company's falling profits will necessitate a few changes in the way his department accounts for the cost of information services.

New York Life historically has been highly profitable, and its IS department has simply allocated resources to users on a below-the-line basis. For the most part, its services appear to be free.

BY MEGHAN O'LEARY

ILLUSTRATION BY MARTY BLAKE

No more. With the company's descending bottom line in full view, Foy is laying the groundwork for a chargeback system that will hold users accountable for the IS resources they use and that promises to make the IS department a zero-profit center by 1993. As Foy sees it, in order to make that shift successfully he must expand his job description to include consumer education in his new IS paradigm.

Foy is one of a growing number of CIOs who—faced with dwindling budgets, more demanding senior management and a new crop of external competitors for their internal clients—must begin to market their services and find more effective, timely, economical, *competitive* solutions to users' business problems. To some CIOs this means touting their current achievements. To others it means living up to the idea of treating the user as a customer with customer needs and financial concerns. To others still it means involving the customer in the long-term, strategic mission of IT.

"I think the real purpose of [our program] is to make them educated consumers," Foy said.

Selling Pointers

- **Educate users in the "value" of IS services by detailing the monthly cost of their critical applications.**
- **Adopt an internal market economy wherein each department will sell and buy services based on free-market practices.**
- **Benchmark against competitive professional IS service providers.**
- **Appoint liaisons between IS and business functions to help departments use the whole range of IS services for competitive advantage.**
- **Offer hot lines, product forums, end-user support groups and newsletters to keep internal customers informed and interested.**
- **Showcase successful applications in IS-sponsored technology fairs.**
- **Form a steering committee made of senior business-unit management to help keep IS aligned with business goals.**

"Most IT organizations have not been very effective in selling their services [practically]," said Alan G. Hammersmith, a principal in the information technology practice of A.T. Kearney in New York. "In the past they've had a captive audience, and that's what's changing. There are a lot of companies evaluating outsourcing major portions of their organizations. And [the IS organizations] are absolutely going to have to change."

According to Hammersmith, management pressure to reduce costs and the threat of outsourcing are the two biggest factors in the push to market IS services. While they work to respond to these pressures, IS departments must also concern themselves with customer service—something many IS managers know about only in terms of the line function they support. Historically, said Hammersmith, IS departments have been "the only game in town." As a result, they are now operating somewhat behind the curve in terms of competitiveness and service. Complacency "is an inbred attitude," he said, "and a [corporate] culture is the hardest thing to overcome."

By preparing users for the chargeback system, Foy is continuing the work of his predecessor at the company, Thomas L. Pettibone—aiming to change the culture at New York Life by educating users in the business value of the services they already use. In addition to communicating hard facts, Foy sends out monthly memos that tell customers how much they're spending on IS services so that they can prepare—financially, emotionally and intellectually—for 1993, when the memos will become real bills.

The hook, as Foy sees it, is to help customers discover how they can lower IS costs for their organizations. "I want to put them in a position where they can make an intelligent decision," he said. "Sometimes they're insulated from the cost and, consequently, there's no motivation to do anything about it." Foy hopes that a little education will help his customers realize that they are part of the equation in bringing down IS costs. "The emphasis in the past has been on the reporting," he explained. "I would hope, in the future, it would be on what we can do about it."

"I think customers still operate with the old feeling of, 'Gee, there's a bunch of IS resources there, and by golly, I want to get my projects done,'" said Pettibone, the former New York Life CIO. "People who have to make the decision about expending project resources and adding bells and whistles have no accountability for it." Pettibone, who left the company at the end of 1991 to pursue other opportunities, believes in establishing IS as an internal "insource," running it as a business. That way, he said, "if a customer can't perceive value and is not willing to pay $100,000 for it, that's fine. [You] won't be working on systems that aren't worth it to the customer."

Understanding how their internal customers perceive value promises to be a long learning process for many IS organizations in the throes of developing marketing strategies.

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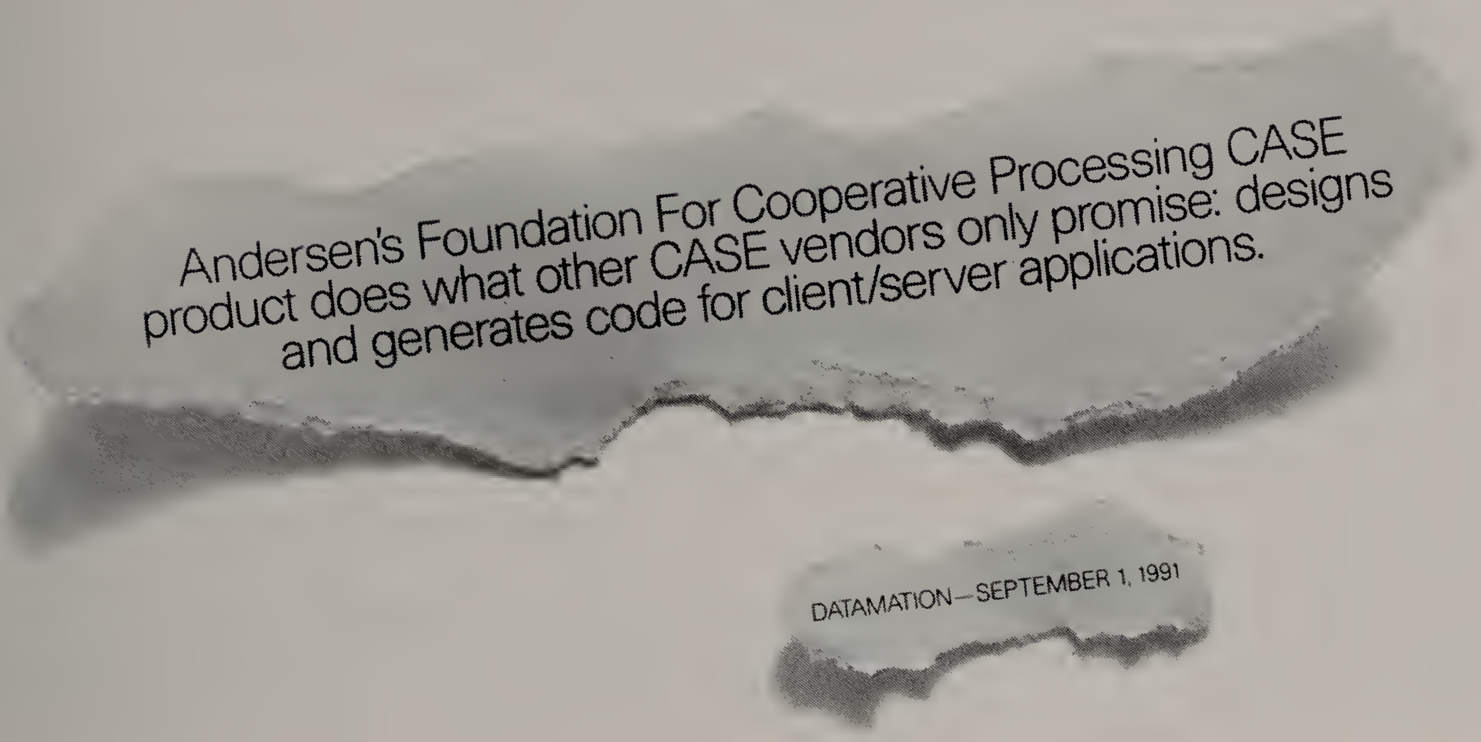

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Robert P. Robinson, planning manager for information management at Esso Petroleum Canada in Toronto, is learning that lesson firsthand as his company moves to adopt an internal market-economy model wherein each business unit will interact with the others as if operating in a free-market economy. Like an external IS provider, Robinson's department must now identify and court customers, negotiate contracts, specify products and services and bill for them.

Competing against an external market on performance and price will force the IS department to focus on the customer and to operate more efficiently, according to Robinson. This year Robinson's department will price its services at cost and be expected to break even. Esso users will be forced to use the IS department as their supplier. In 1993, however, the IS department must price competitively, and customers will be free to choose the supplier they want.

With 1993 in mind, Robinson is busy learning about benchmarking. "We've traditionally benchmarked against IS-type organizations in other large companies, and we've always thought of them as our competition," he said. The switch to a market-economy model "forces us to realize that those aren't our competitors at all. Our competitors are EDS, IBM and Arthur Andersen. We're having to benchmark ourselves against them. This is a whole new ball game for us."

Robinson has decided to neutralize the threat from external competitors and learn how to better serve his customers at the same time. His department is forming alliances with some of its new competitors, agreeing to give them business if they show Esso how to provide service competitively. If those alliances work well, he plans to put together a board of senior managers from systems-integration companies who, for a nominal fee, will act as directors of Esso's IS department and provide valuable input on its operations.

While threats—explicit and implied—are an effective motivator for slow-moving IS departments, there are corporate cultures where internal marketing of IS is a longstanding tradition rather than a reaction to increasing business pressures.

At 3M of St. Paul, Minn., long admired for its encouragement of internal innovation and entrepreneurship, the concept of IS partnership with internal clients is so widely accepted that the word "marketing" sounds overblown.

For years, 3M's IS group has maintained a liaison relationship with every business unit. IS staffers work regularly with specific units to help them find and use appropriate IT resources and to consult with them on systems methodologies and strategic planning. In the past, according to Dave Drew, staff vice president of corporate IS, user departments might work with one IS person on one project and with another in an end-user support group, without really being aware of the range of services IS offered. "We decided that this was too complicated to work for somebody who didn't quite know what they wanted," said Drew.

3M's IS group further serves users and executive staff by offering them a wide array of education and support opportunities: hot lines, product forums and end-user support groups for nonstandard products as well as for company staples. What Drew describes as a "well-read and well-circulated" newsletter lets users know about all the products the IS group supports.

The importance of visibility is further underscored at The Travelers Companies in Hartford, Conn., where an annual corporate Technology Fair makes good use of the IS department's achievements by publicizing them to all attendees. The fair is organized by the IS department, but users demonstrate their own departmental applications for their peers. The marketing benefits of the fair are many: Users get to see applications that are already successful—and, therefore, should not be difficult to implement in their own departments; the technologies being touted are those that the IS department supports and believes in; and IS receives invaluable user feedback. "You might find out from a user that you weren't as clever in designing an application as you thought," said IS Vice President Julian Coolidge.

"Part of this is a picture is worth a thousand words," said Larry Bacon, senior vice president of information systems. "I can talk to you forever about the value of a tool, but until you've seen it for yourself, you may have a tough time envisioning how it will help you."

Promoting products, however, is only a part of The Travelers' and 3M's IS efforts. Conducting management education and encouraging buy-in are also critical components. And while both companies stress the importance of getting the word out

In addition to communicating hard facts, Foy sends out monthly memos that tell customers how much they're spending on IS services so that they can prepare—financially, emotionally and intellectually—for 1993, when the memos will become real bills.

In Fighting Form

IS departments can become leaner and meaner by limiting their intake of support functions and exercising the option to outsource

If IS departments are not competitive, it may not be their fault, according to Alan G. Hammersmith of A.T. Kearney's information technology practice in New York. Upper management wants IS to cut costs; users demand greater speed and quality. But both groups need to remember that their slow, fat IS departments are a microcosm of their slow, fat companies.

"Today IS departments are very structured, vertical organizations," said Hammersmith. In addition, IS groups are often weighed down by the responsibility for systems that, while essential to company operations, deliver relatively little value to the bottom line. In order to operate competitively, these organizations must shed some of that weight.

"IS organizations have continually assumed more responsibility by taking over office functions, telephone functions; and their budgets have become very significant," Hammersmith said. "With very large budgets, you have a very high exposure. Some IS groups, in order to be effective, have had to move from the support role to higher-value contributions."

CIOs "have to be selective about projects and adding value to the corporation. If other people can provide support services more cost-effectively, then they [should do] that in the future." Hammersmith believes that many IS groups that choose to operate competitively will end up outsourcing what he calls "lower-value" applications and selected portions of development in order to concentrate on higher-value applications.

Despite the importance of good IS-user relationships, long-term relationships can sometimes be a hindrance, according to Hammersmith. "A lot of things are done in the corporation because of relationships that have built up over the years between programmers and users," he explained. "But it's a large part of [the IS department's] fixed cost without any financial analysis of the need for those decisions." He believes that corporations need structured resource-allocation decision-making processes that apply across the company. *–M. O'Leary*

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about effective products, they also agree that the larger context of the job is not marketing IS services but aligning them with the objectives of the company.

3M has a successful program that teaches executives about the capabilities and potential of the company's technology infrastructure and gives them a forum to speak out about where the IS group is *not* meeting their expectations. The company also has a very effective executive steering committee that has reviewed IS strategies and kept them in line with corporate objectives for the past eight years.

Such efforts point to the inescapable conclusion that, however effective in the short run, marketing does not constitute a strategic role for an IS organization.

IS groups have to make sure that they're working on the right things, according to A.T. Kearney's Hammersmith. They have to make sure that they're working on applications that are delivering both customer and shareholder value.

3M's IS group offers users and executive staff support opportunities including hot lines, product forums and end-user support groups for nonstandard products as well as for company staples.

"This is part of a lot of things we're doing to get the relationship between IS and line businesses to be close and interactive, and to get all of the barriers between those two groups out of the way," said The Travelers' Bacon. "In my mind, the primary reason to [market IS services] is to get key people in the line business areas to understand technology that could be of value to them, to help them imagine ways that they could use information technology in their business.

"In the old days, you didn't have to be a genius to envision using computers for billing," he said. "Today it does take some genius to envision [new solutions]. The way to do it is to have a continuing partnership where there's a lot of give and take."

Bacon admits that he will always have users who don't perceive the value in his services. But his confidence is bolstered by the many Travelers employees who, thanks to his efforts, are using technology to come up with faster, better business solutions in very short times.

"The biggest change is now, when you read the business plans of [line] organizations, the technology is all woven in there," Bacon said. "That's the reward in my mind."

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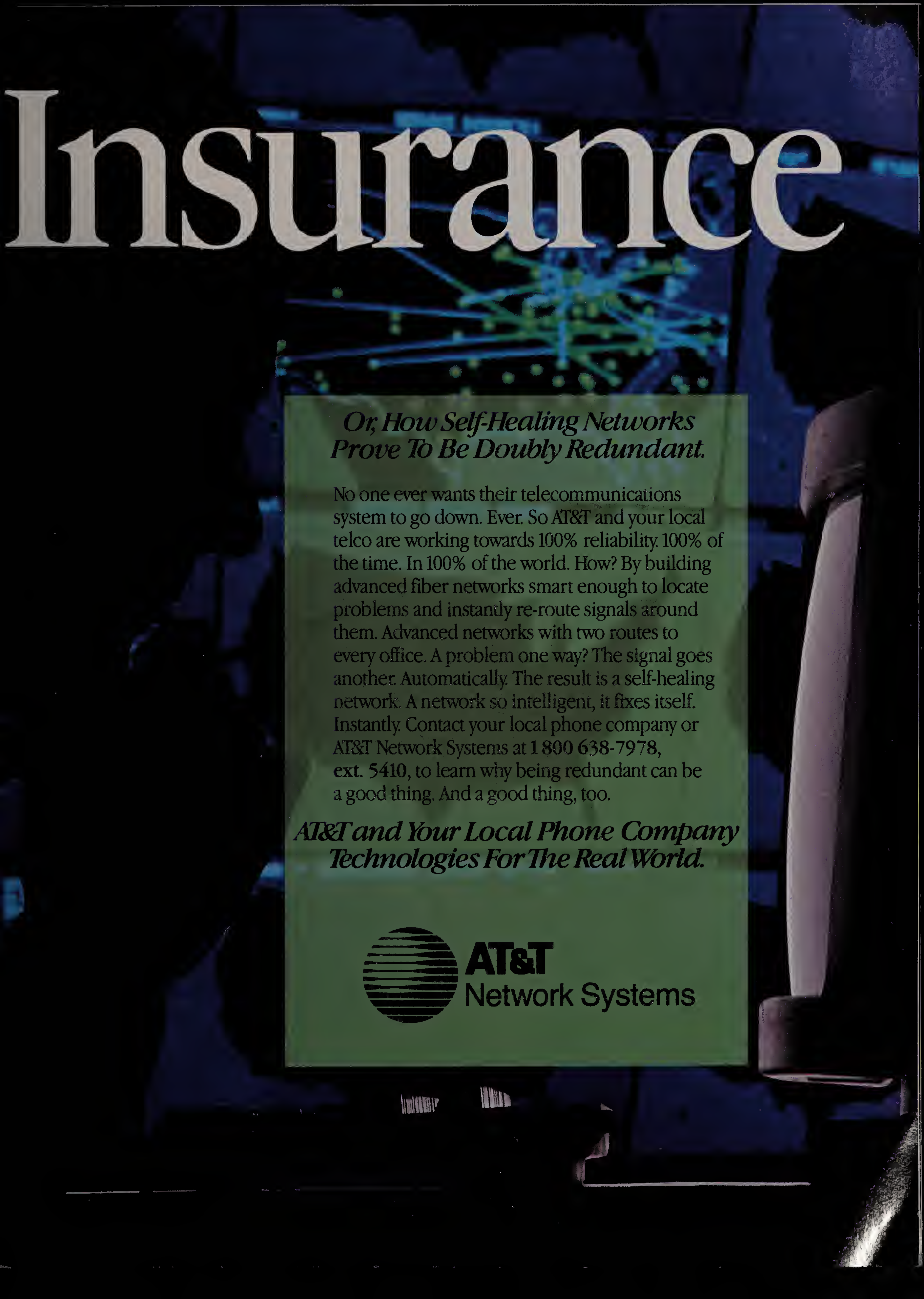

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THE EDUCATION *of a* LINE MANAGER

BY LUCIE JUNEAU

STORYLINE

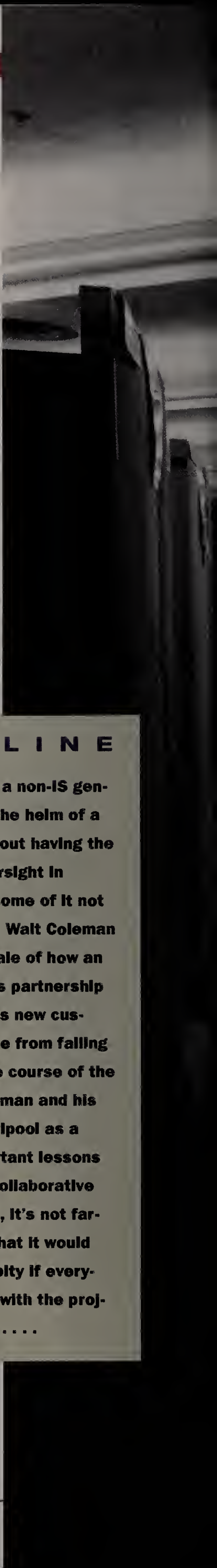
What happens when a non-IS general manager takes the helm of a major IS project without having the proper technical oversight in place? Plenty—and some of it not so good. Fortunately, Walt Coleman survived to tell the tale of how an emerging IS-business partnership kept Whirlpool Corp.'s new customer-service hot line from falling into the abyss. In the course of the rescue mission, Coleman and his colleagues (and Whirlpool as a whole) learned important lessons about the power of collaborative relationships. In fact, it's not farfetched to suggest that it would have been sort of a pity if everything had gone right with the project in the first place . . . .

Meet Walt Coleman, the new, improved line executive. He's now the battle-tested veteran of a predictably harrowing major IS project, one that went off the rails and had to be yanked back on, probably at considerable risk to the careers of all involved. For Coleman and his company, Whirlpool Corp., the happy outcome is that their brand new customer-service system works as promised. But maybe an even happier—and more enduring—outcome is that the ordeal forced Coleman and others to discover the power of a strong leadership alliance between IS and business executives.

Coleman, who is vice president of consumer services operations at the Benton Harbor, Mich., maker of major home appliances, had to learn the hard way that technology doesn't take care of itself. And Whirlpool had to learn that its IS group, which had hitherto been in the doldrums of a low-impact, low-profile role, could make a positive strategic contribution.

When Walt Coleman arrived at Whirlpool in June of 1989, his mission was to reengineer the company's approach to customer service and bring the service organization into the 1990s. His first assignment was to develop and implement a one-call service system—a hot line to diagnose customers' problems on the spot and either provide immediate assistance over the phone or else dispatch a service technician.

As the world's leading manufacturer and marketer of major home appliances—including Whirlpool, Kitchen Aid and Roper brands—Whirlpool schedules service visits to a million homes and fields



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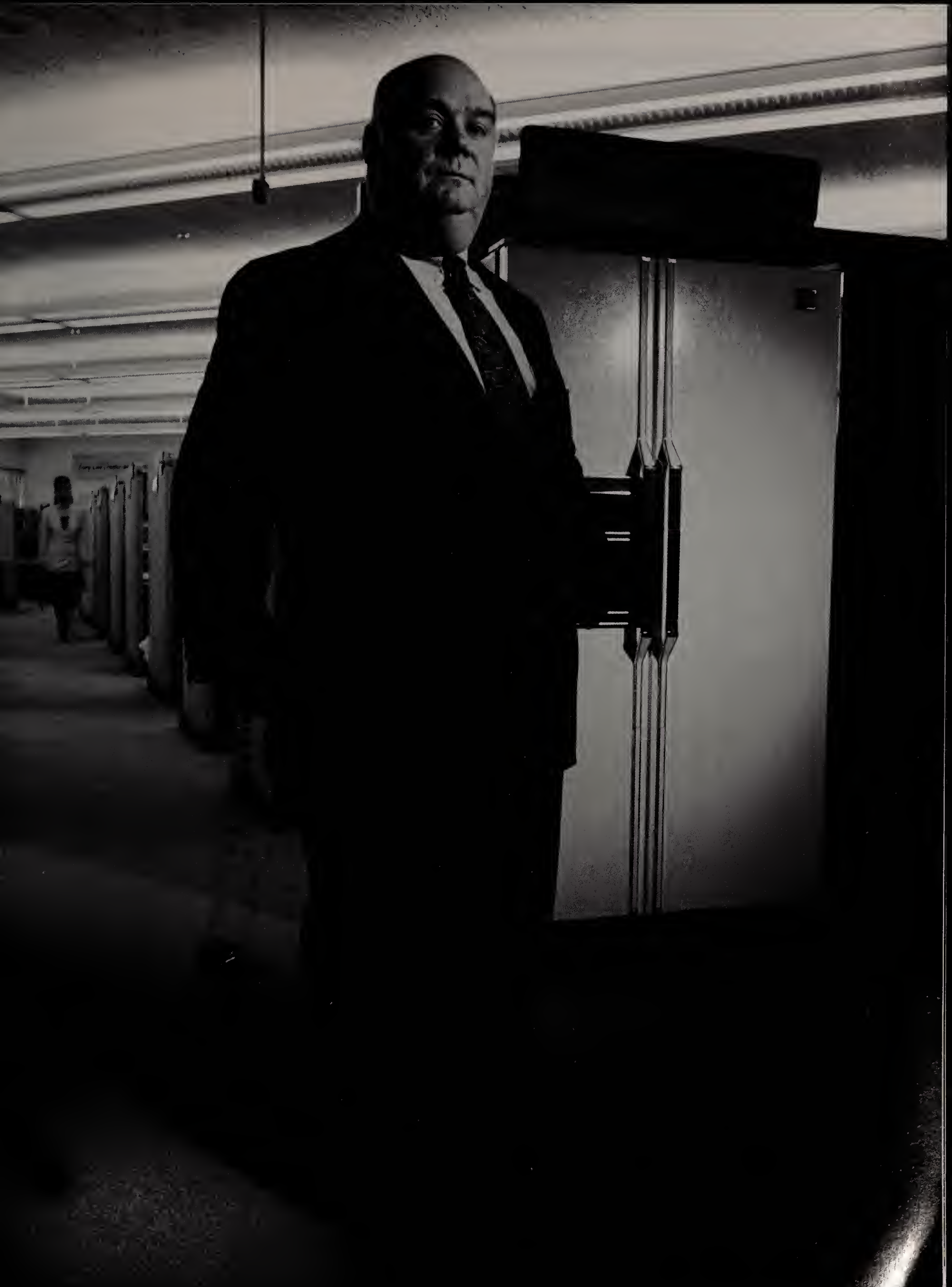

RICH KOELLER: *helping IS achieve a more global profile within Whirlpool*

over three million phone calls in the United States each year. Establishing the new hot line would allow Whirlpool to respond to customers' needs more quickly while reducing the expense associated with unnecessary home service calls.

To enable Whirlpool representatives at the company's two U.S. consumer-assistance centers to provide product information and diagnose problems over the phone, Whirlpool would need to put a wealth of information at their fingertips. It was clear to Coleman that the task would pose technical challenges.

Complicating those challenges was the fact that Whirlpool's IS group was deemed unprepared to meet them. Under the leadership of new Vice President of Information Technology Rich Koeller—who started at Whirlpool on the same day as Coleman—IS was regrouping to take on a more active, visible role and identity. But it was far from ready to deliver a project of the magnitude Coleman envisioned. So he decided to search for a systems integrator.

"Before Rich and I came to this company," said Coleman, "IT . . . was a background function, involved in payroll, batch reporting and so forth. It was to be seen and not heard."

Added Koeller, who was then just beginning to stir up Whirlpool's quiescent IS department, "There was no way we could do a massive project on time with our internal resources."

So, four months after arriving at Whirlpool, Coleman hired IBM to evaluate the hot-line project and produce a requirements-and-analysis report. Based on that report, which outlined the technical requirements and estimated cost of the project, Coleman brought IBM on board to design and build the one-call customer-service system.

Coleman realized that the project team—which consisted of about 75 IBM staffers and 15 people from Whirlpool—would need in-house leadership to keep everyone's efforts focused on the goals of the new system. To oversee the project he hired Bruce Dacre as project manager. Dacre, said Coleman, was someone "who understood the business case, and some information technology." In addition, although he had never before run an IS project, Coleman suspected there also ought to be someone from Whirlpool who could provide expert oversight on technology issues and keep IBM on track. (By his own account, Coleman had just enough knowledge of information technology to get him into trouble.)

"I was looking for a sponsor from within the IT community to support my business side, someone we trusted and could go forward with. [But] the IT organization had just started to really come together and define its role within the corporation." So Coleman did without—a decision he would later have cause to regret.

Lacking an internal IT champion, he relied on IBM to provide technical leadership. "I was looking for the integrator to provide technology and IT support for the project. This is where problems started to develop." Coleman had "visions and ideas" for the system, but "what was not as well thought through was the technology to back those up," he admitted.

Nevertheless, according to Dacre, because the systems integrator made the technology sound relatively simple, Coleman was lulled into believing that the project's technical details would work themselves out. "Next time, he'll know enough to ask more questions," said Dacre.

When a systems integrator doesn't receive strong technical leadership from its client, the project can wander off course. In this case, according to Coleman, IBM took the project into deeper technical waters than was really necessary. "They were going for technical elegance. They were doing what they thought was right, and we were thinking they knew what we wanted. [But] they got off on tangents, and we did not provide the discipline to stay on course."

Although it is the systems integrator's job to select technologies that will best serve the customer's needs, without guidance it can be difficult to gauge the cost benefits of different IT options. Consider the problem of evaluating the cost of improved system response time. Is a 30-second response time good or bad? And how much improvement is worth how much systems investment? According to Koeller, it takes an experienced systems pro to understand that the cost of going from 30 seconds to 10 seconds is relatively low, while the cost of going from 10 seconds toward zero is inordinately expensive—and possibly not worth achieving. Because Whirlpool didn't have its own technical project leader, IBM was left to determine how much technology was enough.

> *"We were close to one of the key delivery dates when we found out we were on the beach."*
>
> *—Walt Coleman*

By default, the job of serving as technical liaison fell to Dacre. Although Dacre did his best to control the project's technical direction, Coleman now concedes he was in over his head. About a year and a half into the project—a period during which Dacre did his best to keep the project moving while trying to shield Coleman from technical problems and "filter and explain" technical issues—Coleman realized the effort was in trouble. "We were close to one of the key delivery dates when we found out we were on the beach," Coleman said.

Up through March of '91, the project team was still planning to deliver what Coleman calls "the kernel" by May of that year. The kernel, a key piece of technology, is the rocket science part of the project, said Coleman. It's what enables a customer-service rep to move quickly among all of the system's applications by clicking on the appropriate screen icons (see related story, Page 46).

"When delivery time came, that's when we knew we were in trouble," said Coleman. The kernel's design wasn't ready, and as the team worked to complete it, it discovered conflicts between the kernel's design requirements and the design documents that had been prepared for some of the system's applications, which were already being built.

Lessons from the Spin Cycle

· ·

With the harrowing part behind them, Whirlpool's IS and business executives can wring enduring benefits out of their new alliance

Now that they've learned to work side by side, Whirlpool's business and IS professionals are more attuned to one another's concerns, according to Walt Coleman, vice president of consumer services operations. "I'm thinking more like them, and they're thinking more like me," he said. "I have a lot more knowledge and understanding of [technology] than I ever thought I wanted."

What other lessons did Coleman and his colleagues glean from the business-IS partnership that wrestled Whirlpool's hot-line project back on track?

- **IT awareness helps assess likely systems ROI.** Coleman is more aware of technical issues and better positioned to estimate the costs of technical enhancements—and hence to weigh benefits against expense.
- **Dialogue leads to deeper levels of collaboration.** Now, instead of simply facilitating Coleman's goals, IS helps the business group to establish goals.
- **Modeling behavior trickles down.** Thanks to the partnership forged by Massey and Dacre, many IS and business professionals now interact regularly—both formally and informally. They are learning to understand one another and to exchange ideas more easily. For example, IS professionals have stopped using acronyms and technical "insider" language with their business colleagues.
- **Sensitivity can't be developed in a vacuum.** Forget about running seminars on mutual understanding. Instead, start with a mission and build a team.
- **Familiarity breeds familiarity.** Sharing successes as well as occasional failures has helped Coleman's project group to coalesce.
- **Marketing pays.** Celebrating the group's successes has helped to maintain enthusiasm for the project among users.

—L. Juneau

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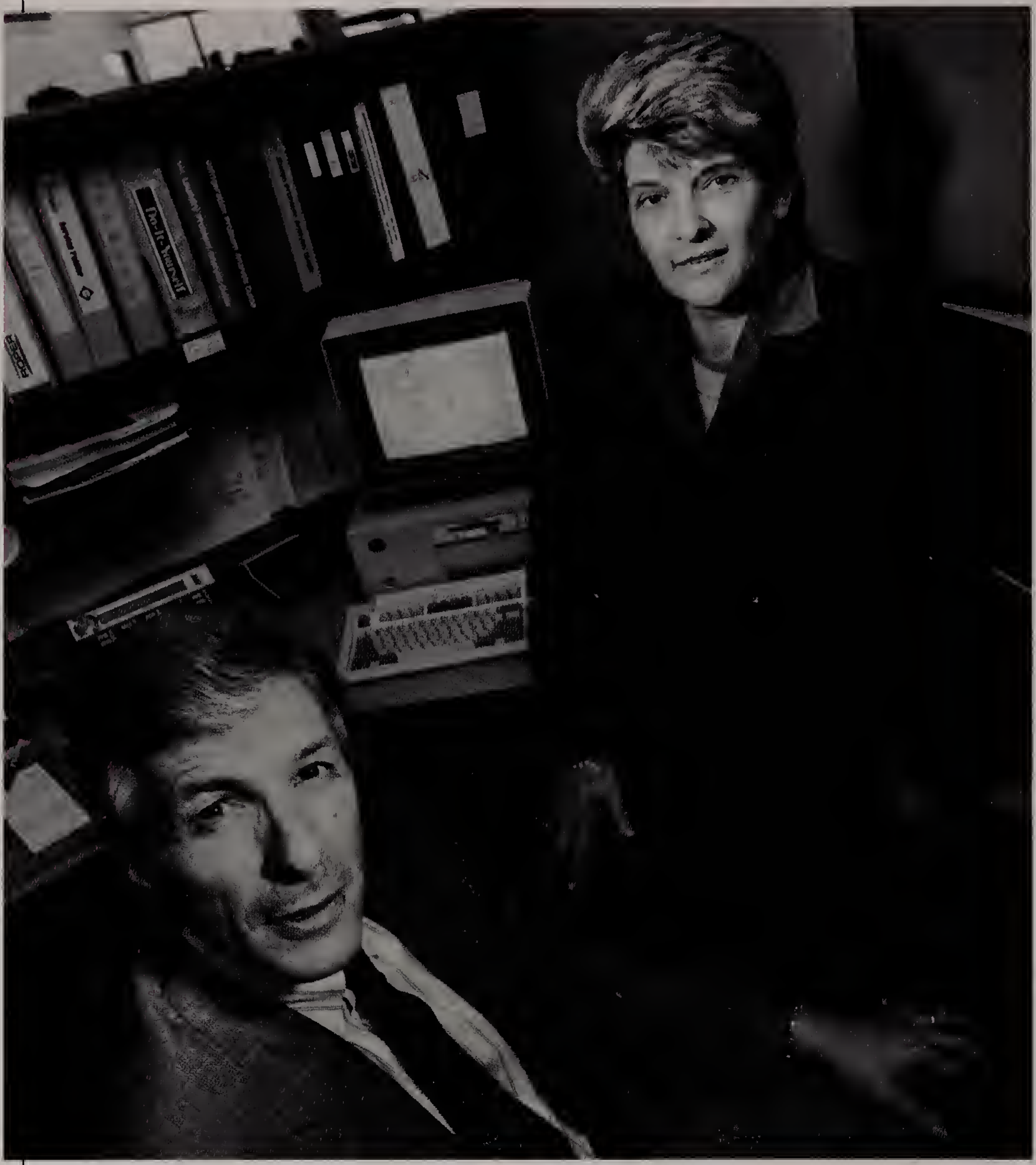

BRUCE DACRE *and* **JAN MASSEY:** *co-piloting the revised project plan*

Maybe the only good thing about realizing you're in trouble is that you can begin to do something about it. Coleman, the custodian of the project's overall vision, zoomed in on the forest to look more closely at the trees. At first, he said, he had been "too naive about how long [the project] would take and the pitfalls we would [face]. You need everybody focused on the same objective. You can't have varied agendas."

When team members get distracted and start adding to a project or changing its focus—saying, in effect, "Wouldn't this be nice?"—they can pull a project down. A manager has to keep the team focused on the ultimate goal so that individual members don't optimize their own objectives at the expense of the overall project. In this case, said Coleman, the team's technical players let time and material get away from them.

Fortunately, he had begun developing a rapport with Koeller and Whirlpool's IS department almost from the project's inception. According to Coleman, Koeller had been drawn into the project because of the need to link the new system to internal IS resources, such as the company's sales order-processing system. Some nine months after Coleman and Koeller both arrived at Whirlpool—and at about the time the project got its funding and was begun in earnest—the IS group started to play an advisory role. "They didn't have any direct responsibility, but they were providing help and guidance," said Coleman.

"Rich quickly became my IT sponsor," said Coleman. "Not that he wanted to take over, but he wanted to help." He and Koeller began to exchange ideas. "At the beginning of the project, for example, we were going to put the system on an IBM AS/400 platform that wasn't integrated with our corporate system. Rich said that was a mistake." Koeller convinced Coleman that the system belonged on a mainframe.

Whirlpool old-timers warned Coleman not to put much faith in the IS organization. But Coleman hit it off with Koeller and liked his collaborative attitude. "I had confidence in him and he in me."

In July and August of '91, Coleman's team set to work to revise the project plan. "We had to sit down and do a detailed review of where we were, and what it would take to finish," Coleman said. "We didn't want to fix blame for what happened, but to determine how we were going to fix it."

> *A manager has to keep the team focused on the ultimate goal so that individual members don't optimize their own objectives at the expense of the overall project. In this case, the team's technical players let time and material get away from them.*

There was an obvious need to transfer technical leadership of the project to Whirlpool. Koeller provided a resource manager from the IT community. Jan Massey would work in close contact with Dacre, who would now manage the business side of the operation only. IBM's technical

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staff would report to Massey.

"She should have been on board from day one," said Coleman. "We need IT leadership that can understand the business case. Conversely, we need business people who can venture into technology to get some ideas. Both need to cross the line to communicate better." The combined strengths of Dacre and Massey were needed to make things work.

Selling the reorganization plan to upper management was a challenge. "When you walk in and say [a project] will take longer and cost more money [than expected], you don't get a real warm reception," Coleman said. "There was disappointment, and the question came up of whether we should stop [the project]," he said. "[But] I was so convinced it was going to work that there was no gauntlet I wouldn't have tried to run to get it done."

In large part, the success of the effort was now in Massey's hands. Trusting in her abilities was risky for Coleman. But he accepted Koeller's choice of a project leader, knowing that Koeller understood that the selection could make or break the critical project. For her part, Massey was encouraged to note that Coleman and Koeller agreed on the project's vision and objectives. When the executive sponsor and the IT resources sponsor have the same objectives, said Massey, "they have a shared value and will back you."

According to Coleman, getting the project back on track was both tricky and politically sensitive. "The wheels had come off and we had to get our confidence back." Dacre had to relinquish some of his control. "That was difficult," said Coleman, "but quickly and pretty efficiently roles were redefined." Dacre and Massey "started pulling together." As a consequence, he said, they learned that although they're both strong individually, they're much stronger as a team.

> *"When you walk in and say a project will take longer and cost more money than expected, you don't get a real warm reception."*
>
> *—Coleman*

Massey, Dacre and IBM's project leader were able to form an effective partnership. Working together, the new team expects to complete the project this month, in accordance with the revised timetable. Whirlpool will soon install the system in its 25 U.S. service centers.

Now that Whirlpool's IS group has successfully collaborated with the consumer services group, Coleman says future collaboration will be much easier. (The company is looking at the possibility of expanding hot-line services to all of North America; they are presently confined to the United States.) It will also be easier for IS to work with other departments at Whirlpool.

So, despite the difficulties, Coleman now counts the hot-line project as a big win for the corporation. "There were times when I would have liked to get on a rocket ship to the moon," he said. "But you bet I'd do it again. In retrospect, it's been a great experience."

Lucie Juneau is a freelance writer based in Salem, Mass.

If You Call...

Let's say your refrigerator's ice-maker suddenly won't make ice

Whirlpool's customer hot-line system consists of three main components: a telecommunications network, an expert system and an image-retrieval system.

Customers reach a customer-service representative (CSR), by dialing a toll-free number into an AT&T T1 network. Depending on the call's origin, it is sent by an area-code router to a service center in Benton Harbor, Mich., or in Knoxville, Tenn. (Redundant T1 networks—the one from AT&T and a backup from MCI—link the two locations.)

With the help of interface software from Aristacom International Inc., of Alameida, Calif., the call moves from the phone switch through a gateway to an IBM 3090 mainframe. Using AT&T Automatic Number Identification technology, the system automatically checks a mainframe database for a customer profile. If one exists, it travels with the call to a CSR.

The CSR, working at an IBM PS/2 workstation running OS/2 and IBM Presentation Manager windowing software, can access a diagnostic expert system (based on an AI platform from Aion Corp. of Palo Alto, Calif.) and lead the caller through questions that yield a diagnosis and a cost-effective solution. (Whirlpool is implementing a second expert system to help potential buyers determine which appliances are best suited to their needs.) If appropriate, the CSR can schedule a service visit.

The CSR can also access an image-retrieval system (based upon OPTI*WARE, from Online Computer Systems Inc., of Germantown, Md.) to look up detailed service and product information.

Finally, if the CSR must transfer the call to a more experienced operator, all of the assembled information is forwarded automatically. *—L. Juneau*

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GEARING UP

Detroit's Big Three are investing heavily in IT-supported process changes they hope will help them regain their standing as high-performance corporate leaders

BY DAVID FREEDMAN

IT HASN'T BEEN THE BEST OF TIMES FOR THE BIG THREE *U.S. automakers. Although it recently reported turning a profit, GM is still feeling the effects from the largest quarterly loss of any corporation in history; battered Chrysler is dealing with the rocky transition to a new CEO; and Ford, even though faring somewhat better than the other two, has continued to lose market share to the Japanese and been beset by recalls of 1.5 million vehicles in the past year.* 🚗 *As everybody knows, the Big Three have attempted to cope with all this turmoil by instituting everything from rebates to restructuring, with a good dose of protectionist lobbying thrown in. Less well-known is that they are also making massive investments in far-ranging information systems projects. In the end, these systems may do more for them than import quotas ever could. "If I tried to estimate the impact of these systems, nobody would believe me," said GM Vice Chairman and Chairman and CEO of GM Hughes Electronics Robert Schultz. "It runs into the billions. We couldn't be competitive without [them]."* 🚗 *The systems cut across many areas, and in novel ways. They have to: All the conventional wisdom about automobile manufacturing has gone out the window as powerful competitive and market forces reshape the industry. "What's changing?" asked Roy Sjoberg rhetorically; "What isn't changing?" Sjoberg should know; he led the team that designed and produced the Viper, Chrysler's hot new limited-edition sports car that has come to symbolize the company's ability not only to meet consumers' expectations but to blow their socks off.* 🚗

ROY SJOBERG, RONALD ROGALSKI *and* **JIM SAYEN** *(l. to r.): Chrysler's Viper team*

PHOTO BY JON MURESAN

CHRYSLER: *Design Redesign*

THERE IS A GROWING PERCEPTION THAT the best way to design a car may be to insulate a group of top-notch designers and engineers from corporate inertia and bureaucracy. That's what Chrysler did to develop the production version of the Viper, a sexy two-seater that has been winning the sort of accolades from car enthusiasts that Detroit hears all too little these days. Sjoberg, executive engineer, credits two information systems with providing some of the structure the team needed to meet what seemed like an impossible goal: to design and build a radically different production car virtually from scratch in three years.

In Detroit, the task of designing a car has traditionally been parcelled out to dozens of departments and divisions whose efforts are not very tightly coordinated. As a result, it typically takes five years to bring a car from concept to assembly line. Sjoberg had only a little over half that time, so he turned to a DEC VAX-based project-management system from Lucas Management Systems. "In the car industry, there is no A-to-Z road map that tells you what it takes to design and build an automobile," said Sjoberg. "The software forced us to . . . allocate the personnel and time up front to determine what it would take to build this car."

What it would take, the software told Sjoberg, was some 900 separate major tasks. Over the course of the project, these tasks were distributed to team members who had responsibility for keeping track of whether or not each was being completed on schedule. Every other week the entire team met to plug any delays into the software, which would then calculate what adjustments had to be made to keep the project on track.

"If a wheel/tire engineer came in and announced he had a problem," Sjoberg recalled, "the program would identify who was impacted in what way, so we'd be able to discuss how to make it up."

The second system was a database that tracked every design issue related to the car. That one database became a source of information to engineers, managers, suppliers, purchasers and anyone else who came into contact with the Viper project. Because of it, nothing ever slipped between the cracks. "If a sun visor failed a durability test, the purchaser and manufacturer were brought into the loop real quick," Sjoberg said.

Sjoberg believes that the real value of the experience with these modest systems will be in helping to establish a standard approach to the process of car design at Chrysler. "Every platform [type of car] has had its own approach, but now these approaches are being integrated."

FORD: *Manufacturing Management*

IMPROVING MANUFACTURING PROCESSES continues to be important to Big Three health and well-being, though the focus is changing. While CAD/CAM is still important, it's no longer news; robotics and machine control aren't the hot topics they once were, either. The new emphasis is on better applying information throughout the various stages of manufacturing in order to cut costs, speed turnaround and improve quality.

Ford has undertaken one of the most ambitious efforts along these lines. Dubbed the Corporate Manufacturing Management System (CMMS), the project seeks to standardize and streamline virtually everything Ford does in its hundreds of plants worldwide. "Whether it's a trim plant, plastics plant, casting plant or assembly plant, the system employs common business practices to handle all the check points in the process," said Roger Bisschop, manager of CMMS operations planning for Ford.

Bisschop noted that the system, which covers everything from materials requirements and inventory to supplier notification and receivables, is already installed in half of the 58 plants the company operates in North and South America. "It's a mammoth program, one of our key IS projects for the 1990s," he said. "So far it looks as though we have a real success on our hands."

By carefully tracking the movement of materials through a plant as they are turned into finished product—and by matching this movement to supplier shipments and orders for the finished product—the company expects to lower its manufacturing costs.

But Bisschop insists that wasn't the motivation for the system. "Even saving a dime per car can make a big difference, but that's not the purpose," he said. "With the kind of competition we have today, we have to do everything better. Not only that, we have to do it faster and more efficiently, while satisfying the customer and providing quality everything. We have to make sure that whatever we produce is the best in

PHOTO BY JON MURESAN

ROGER BISSCHOP: *Unisys has taken over many of Ford's "tactical" manufacturing systems.*

A Knowledge Bank

An ambitious program at Ford that recognizes knowledge as a corporate asset could help bring artificial intelligence into the mainstream

Ford's AI project originated in the company's electronics division, responsible for designing the instrumentation and engine-control components that are produced at several different Ford plants worldwide.

It began when David Fawcett, advanced technology manager for the division, noticed that a number of electronic chip designs were being returned by plants with requests for modifications required by their particular setups. Fawcett decided his engineers needed a system that would automatically determine whether or not a particular design would cause a problem for any of the company's plants.

"We want our plants to make things, not to have to worry about whether they can make [them] or not," said Fawcett. "That just adds time and labor to the process."

The resulting expert system consults a series of rules to identify problems and suggests various solutions, letting the designer decide whether to create a new design for all plants or to customize separate versions for those that can't accommodate the original.

That was just the beginning. Ford is now working with the Carnegie Group, an AI software development company of which it is part owner, along with other computer and communications vendors, to implement a new way of storing and accessing complex forms of knowledge.

"Corporate knowledge is an asset," explained Fawcett. "At the end of the day when all the people leave, 50 percent of your corporate worth just walked out the door. We want a way to keep that in the computer."

When the project is complete, said Fawcett, it should provide Ford with software that will, among other things, automatically determine which combination of machines should be used to manufacture a particular part, and answer questions about all aspects of car design.

"We expect to get some short-term benefits from it on specific applications," he said, "but in the long term we want it to solve some major problems for us."

–D. Freedman

its class. That's what we expect this system to help us with."

Ford started the project three years ago, after deciding it needed better control over the manufacturing process. To focus its efforts, the company entered into an outsourcing contract with Unisys; under that arrangement, the systems vendor has taken over the operation of many of what Bisschop calls Ford's "tactical" manufacturing systems, such as those overseeing the production of tractors and climate-control components. Bisschop's group took on the enormous task of replacing the myriad systems running manufacturing in all the company's plants with a single system—*and* revamping the way the plants manage manufacturing in the first place.

Under the new system, many people on the factory floor who never sat in front of a computer now use terminals to help them keep track of every step of the job and stay in tune with other workers—as well as with suppliers and customers. That wasn't a transition that came easily to everyone, noted Bisschop. But an intensive training program helped, as did the extra effort Bisschop's group made to hear what the people who would be using the system had to say about it. "So far the feedback has been pretty terrific."

GM: *Customer Ties*

The Big Three have often been accused of not keeping up with the needs of the marketplace. It was their obliviousness to the consumer shift toward a demand for quality in the 1980s that caused the three companies to lose so much market share to the Japanese, many critics say. To avoid making the same mistake twice, the Big Three have stepped up their efforts to maintain closer ties to the car-buying public, using dealers as their conduit.

Information systems play a critical role here, according to GM's Schultz. "We're trying to link with dealers in a much more effective manner than in the past," he said. For example, GM has set up a satellite-based network that carries voice, data and video among headquarters, dealers and regional offices. That allows the company not only to provide information to dealers but also to collect information about customers and vehicle sales.

The result is a massive database that lets GM managers quickly see what's selling in various regions of the country, compare that information to scheduling and distribution, and decide which programs should be modified.

"Suppose we were getting ready to design the next generation of Grand Ams," said Schultz. "We'd look at the customer database to determine who is really interested in Grand Ams. What age bracket are they in? Are they mostly single or married?

ROBERT SCHULTZ: *"The key is to build the proper data stream into every sale. Whether the customer is there for sales, service or parts, we want to know the details."*

Women or men? Do they prefer two doors or four? High-end or low-end packages? All that lets us understand the appeal of our cars in depth so that we can take it into account in the design process.”

It was this sort of analysis that alerted GM two years ago to the growing concern with safety on the part of small-car buyers. As a result, the company now offers more small cars with anti-lock brake systems than any other car manufacturer.

To further strengthen the database, GM is making an effort to get every piece of customer data it can from the dealer. “The key is to build the proper data stream into every sale,” said Schultz. “Whether the customer is there for sales, service or parts, we want to know the details. That might alert us to new opportunities in financial services, or leasing or fleet business.”

Lessons Learned

In order to revitalize their organizations, GM, Ford and Chrysler have had to become more creative in their processes. Here are some procedural guidelines the automotive giants have set for themselves:

- **Make Sure Departments Cross-Fertilize.**

  Chrysler has a number of “clubs” consisting of people with similar job functions from different groups or divisions. “You have to transfer what you learn, right and wrong, to other platforms,” or types of cars, said Roy Sjoberg, executive engineer for the Viper team at Chrysler. “Companies that can’t communicate between platforms will just keep reinventing the wheel.” Sjoberg’s team made good use of IS during its project, and now other groups at Chrysler may be able to do the same.

- **Get Unvarnished Feedback.**

  When Roger Bisschop, manager of Ford's massive manufacturing management project, wanted input from the people on the factory floor, he had to take some extra steps to get it. “When you’re sitting in a meeting and you ask someone what they think, you might get back something that’s more like propaganda,” he said. “So after the meeting, I’d take the plant floor guy out for a cup of coffee and find out how he really felt about things.” The resulting straight talk was critical to the system’s success, said Bisschop.

- **Let Suppliers Write Their Own Orders.**

  GM used to employ hundreds of people who did nothing but chase down suppliers, trying to ensure that exactly the right amount of materials was coming in. Now suppliers are expected to monitor GM’s inventory levels via computer links and to keep their stock at prearranged levels. “We don’t order parts anymore,” said Robert Schultz, GM vice chairman and chairman and CEO of GM Hughes Electronics . “We let [the supplier] worry about keeping the bins filled.”

–D. Freedman

Many car-industry observers say the Big Three will eventually set up systems that would allow a customer to walk up to an ATM-like kiosk and order a car that would be built from scratch to the customer’s specifications. The custom-built automobile would then be delivered in a few days. While that might seem to be the ultimate in just-in-time inventory, Schultz downplays its attractiveness to either customers or GM in favor of less extreme improvements.

“I believe we can offer most customers exactly what they want out of dealer stock,” he said. “The key is to get feedback about customer trends quickly enough to be able to immediately adjust the dealer’s mix of cars.”

The Big Three may not be the first companies to get closer to customers, improve internal processes and turn out higher-quality products more quickly and efficiently, but it’s not easy to change the direction of such massive organizations. Now it looks like IT is helping Detroit finally get back on course. CIO

David Freedman is a freelance writer based in Brookline, Mass.

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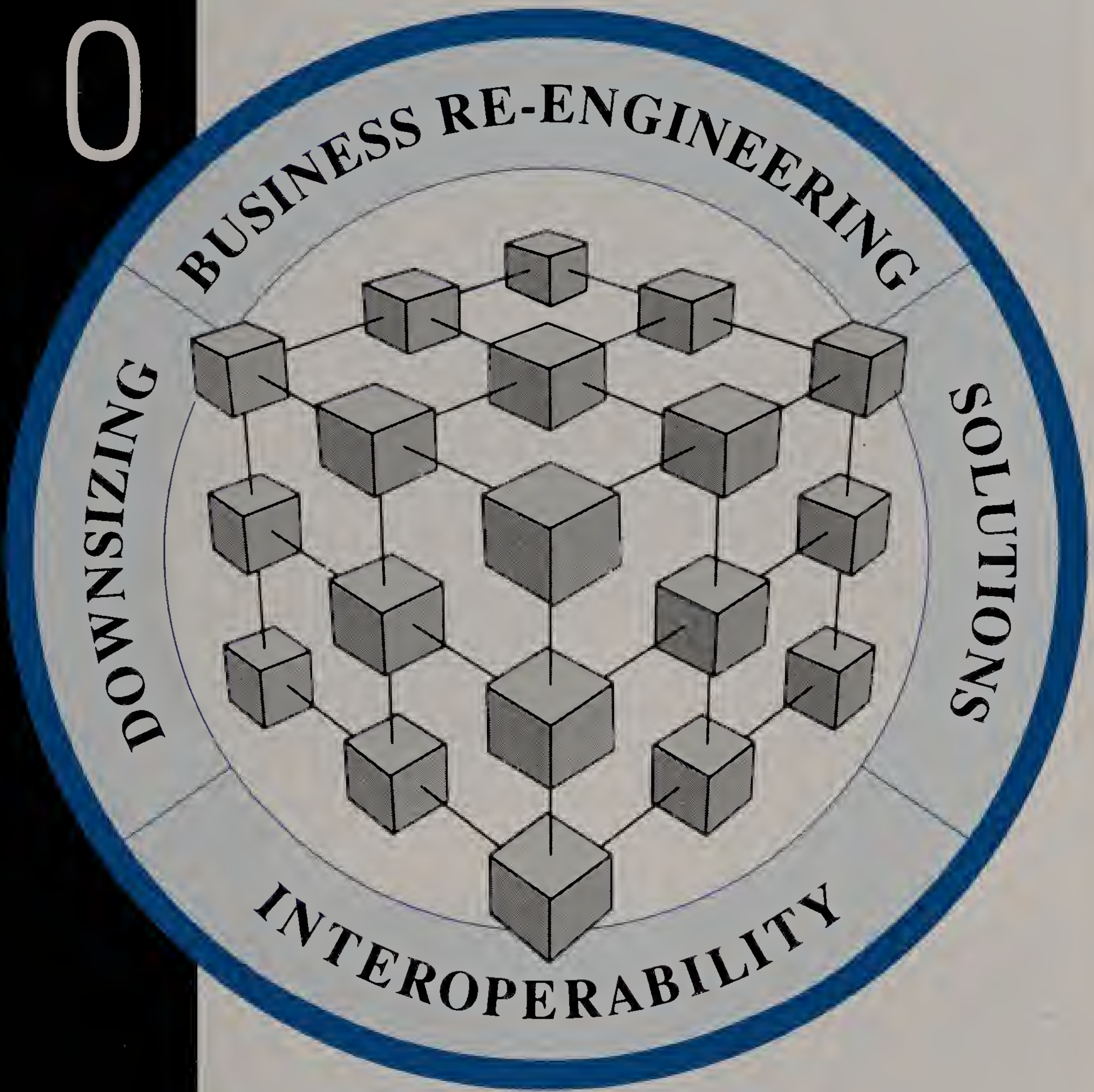

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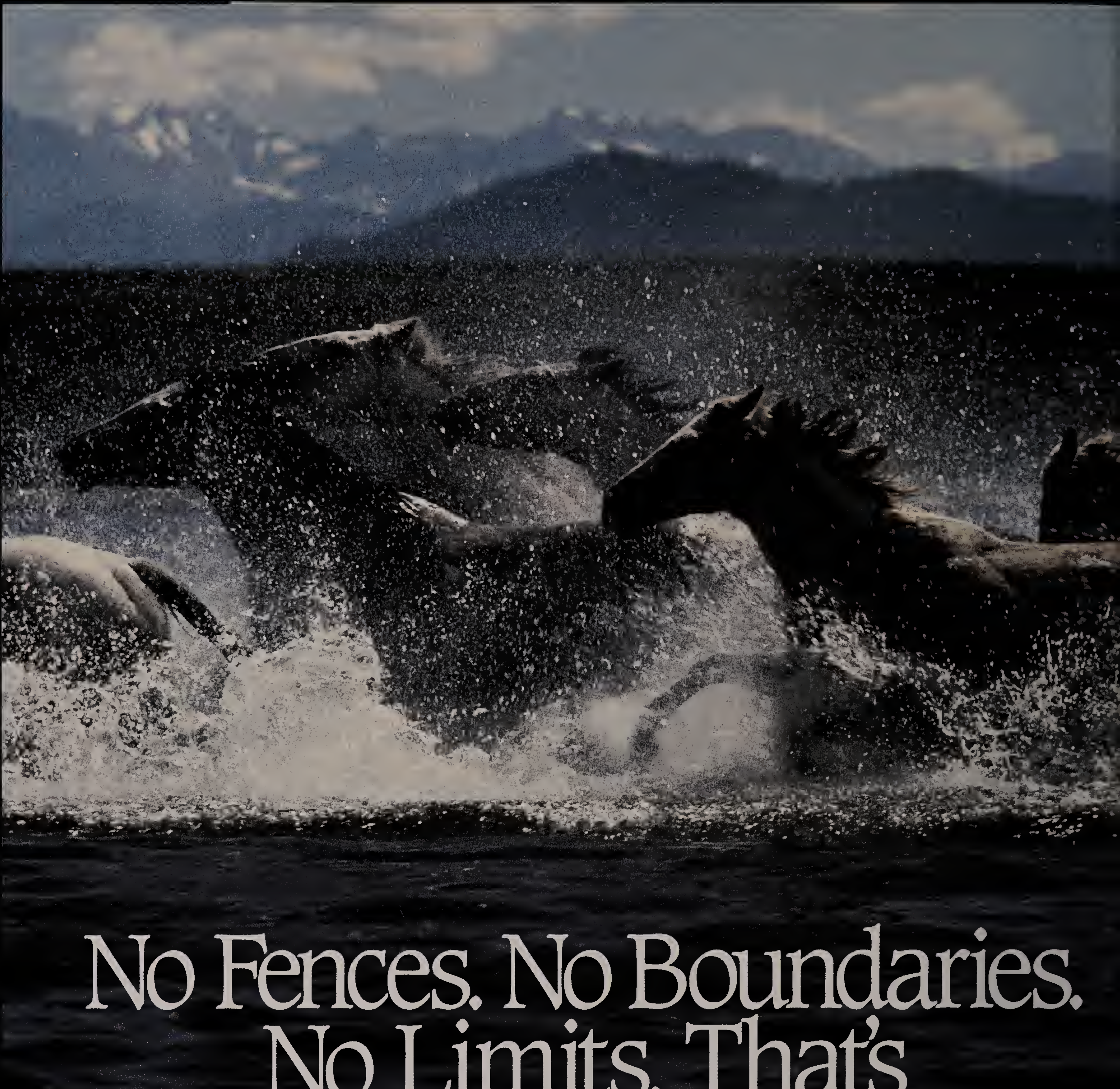

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OPEN·ENDED EFFORTS

BY MEGAN SANTOSUS

By getting even limited numbers of vendors to work together, and by encouraging users to make known their needs, the various open systems organizations are moving the standards-setting process along. Still, a journey of a thousand miles remains a pretty long trip....

If one thing is certain about the open systems movement, it's that the vendor-user dynamic has changed. Now that organizations' computing puzzles can be put together with pieces from a variety of vendors, users who don't like what is being offered by one can spend their dollars elsewhere. But this freedom of choice carries with it a burden of responsibility: In order to play a significant role in shaping the future of their own computing environments, users must be able and willing to tell vendors what they want.

Most of the work in defining open systems and setting and promoting standards is taking place within open systems consortia and alliances where vendors and users can collaborate to varying degrees. Despite the fact that there is not yet (and perhaps may never be) complete consensus among the different organizations, these groups provide vendors with a forum for working together and users with the means to stand up and be heard.

The following organizations are well-established and include a good cross-section of the IT industry among their members. This is by no means a definitive list.

ILLUSTRATION BY BETHANY GULLY

Corporation for Open Systems (COS) International

1750 Old Meadow Road
Suite 400
McLean, Va. 22102
703 883-2700

This nonprofit organization was founded in 1986 to accelerate the adoption of interoperable, multivendor products and services operating under OSI, ISDN and other communications standards. Members include AT&T, Apple, Digital, Motorola, Hughes, Bechtel and J.P. Morgan; each member organization is represented by an executive on the board of directors.

An Executive Committee is elected from within the board of directors and presents a good opportunity for CIOs to get involved. "The Committee determines the strategic directions that COS will address," said COS Director of Information Technology Bill Biagi. "Members focus on the common goals of open systems [and the broad approaches] that provide the most direct benefits to their organizations. It's the best place for CIOs to leverage their membership to accomplish their needs."

COS's Strategy Forum does the more-detailed work, setting priorities and overseeing members' efforts to produce deliverable technology. It is organized into three tracks: marketing, which concentrates on promoting COS; architecture, which deals with the technical and transition issues; and requirements. Groups working within the requirements track provide users with a formal process for making their needs known to vendors. They develop position papers outlining their technical requirements and present them to vendors at meetings held four times a year. Users trying to develop industrywide interoperability standards receive administrative, technical and management assistance. Representatives to the Forum are usually mid-level IS managers responsible for administering network operations or implementing open systems standards at their companies.

The COS Mark Program, established in 1989, is designed to give users a degree of assurance that products meet agreed-upon OSI and ISDN specifications. Mark products are subjected to conformance testing; vendors whose products bear the Mark must adhere to standards of interoperability among their goods and other Mark products.

COS members receive *Optiv*, a quarterly journal devoted to helping users understand the business case for open systems. The articles, which are aimed at nontechnical managers, are generally written by users describing how open systems make them more competitive.

COS also sponsors workshops where users can discuss their open systems problems and objectives with vendors and other users. "The key to adopting open systems is sharing experiences," Biagi said. "How to manage the transition process of migrating from existing to new technology is a big issue among users."

The Object Management Group

492 Old Connecticut Path
Framingham, Mass. 01701
508 820-4300

Eight companies founded this nonprofit organization in 1989 to promote the development and growth of object-oriented software technology. OMG is primarily concerned with influencing four areas of object-orientation: overall architecture, reference model and terms; applications programming interfaces; distributed object management; and object services. Membership, which recently passed the 200 mark, includes American Airlines, Boeing, Data General, Ericcson, Oracle, Sun and Unisys.

From a technology standpoint, OMG's goal is to develop a common framework for object-oriented applications based on industry guidelines. The adoption of such a framework will make it possible to develop a heterogeneous applications environment across all major hardware and operating systems. OMG believes that object technology can solve many of the problems intrinsic to proprietary systems in the areas of application interoperability, multivendor environments, multilanguage implementation, and heterogeneous hardware, operating systems and networking.

"In an era of distributed computing, users are asking themselves how they can migrate from legacy systems to a distributed environment," said President Chris Stone. "Object technology seems to be the underlying component that's going to pull this off."

The Object Request Broker (ORB) specification, the result of collaboration among Hewlett-Packard, SunSoft, NCR, Object Design, Digital and Hyperdesk, was adopted last year following a year-long evaluation process. ORB will be a key component in the organization's evolving Object Management Architecture (OMA). The OMA will enable objects to interact over a network of heterogeneous systems. Eventually, OMG hopes that this architecture will enable hardware and software from multiple vendors to exchange information. Anyone can purchase the written specification from OMG for $50.

Standard interfaces developed at OMG are used as parts of the Open Software Foundation's Distributed Management Environment (see below). The organization also has formal and informal agreements with groups such as X/Open and Unix International to advise on object-oriented systems and to share standards. User members can influence OMG's technical direction by participating in the organization's Technical Committee meetings. "OMG is very early on in the technology curve," Stone said, "so users can have quite an impact if they want." In fact, Stone would like to see a lot more users get involved. He spends much of his time "evangelizing" to user companies, where he frequently invokes an analogy for the whole open systems movement: "It's like standing at the water's edge at low tide, where you can jump in or wait until the water surrounds you. Either way, you're going to get wet, so I recommend you jump in."

Open Software Foundation

11 Cambridge Center
Cambridge, Mass. 02142
617 621-8700

OSF was founded in 1988 by eight vendors responding to the alliance of AT&T and Sun. The objective of the foundation is to provide computing technology that enables the greatest possible portability, interoperability and scalability of applications. Today OSF counts over 300 vendors, universities, research firms and users—including IBM, Microsoft, Texas Instruments, JCPenney, Liberty Mutual, Atlantic Richfield and Georgia Pacific—among its members.

Unlike some other open systems organizations, OSF is in the business of developing and licensing products. Its Request for Technology process enables members to submit research proposals and evaluate technology. "Our open RFT process differentiates us from the other organizations," said Cathy Betz, a business area manager. "There is really active participation on behalf of the membership to choose technology."

The OSF/1 operating system, the OSF/Motif graphical user interface and the Distributed Computing Environment (DCE) were the first three technologies developed. Others currently in the works are the Distributed Management Environment (DME) and the Architecture-Neutral Distribution Format (ANDF)—all of which are aimed at providing transparent computing in heterogeneous environments.

"We are hearing end users loud and clear," said Jonathan Gossels, also a business area manager at OSF. "Their primary concern is for the industry to tackle interoperability, and DCE addresses this issue."

DCE is billed as the first integrated solution that enables users to combine computers from multiple vendors into one system for developing applications. Thirty-two organizations—vendors and users alike—provided input during the RFT process.

According to Betz, users today have a lot more power, and they are starting to make their needs known to vendors. "Open systems is being driven by the user organizations," she said. "They have the most to gain, and they can send vendors the message through OSF."

Betz views OSF as a catalyst for bringing together vendors that would not normally work together. This was particularly true during the development of the Motif GUI, which contains contributions from IBM, DEC, Microsoft and Hewlett-Packard.

OSF Educational Services offers a variety of seminars and courses on OSF technology to members and nonmembers. Topics include applications programming, the evolution of distributed computing, DCE design and implementation, and standards compliance. Education is available in a traditional classroom setting or can be licensed to organizations for on-site use.

User Alliance for Open Systems

Corporation for Open Systems International
Attn: UAOS Secretariat
1750 Old Meadow Road
Suite 400
McLean, Va. 22102
703 883-2700

This users-only group has grown from 17 members to over 35, including Amoco, Deere, Du Pont, Kodak, General Motors, McDonnell Douglas and Merrill Lynch. The Alliance acts primarily as a networking organization within which members can share their experiences with open systems implementations and determine common

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goals. Working in association with COS (see above), members can participate with vendors to achieve open systems, which they broadly define in nontechnical terms as systems that provide "unimpeded access to the information to do one's job."

Over the past year, the Alliance has focused its efforts on identifying the major barriers to open systems from a user's perspective and outlining specific "global" actions to overcome them. Among the barriers: the IS department's fear of change, a traditional IT environment unfamiliar with distributed computing, a focus on short-term solutions, insufficient products, and lack of a shared vision among North American users. (The barriers and goals are detailed in "Overcoming Barriers to Open Systems Information Technology," published in 1991.)

"On the surface, people think open systems is pretty logical," said Augie Nevolo, chairman of the Alliance. "But when you start to sell it to end users, the concepts aren't so easy to understand."

According to Nevolo, who is the chief telecommunications engineer at Pacific Gas & Electric Co. in San Francisco, the Alliance promotes free discussion and the sharing of information among users, which is critical to moving the process forward. "A lot of gains will come over time as users begin to see they have similar requirements," Nevolo said. "By focusing on users, we are achieving some of our objectives."

One objective is to come up with a common OSI profile that will serve both industry and government. "The lack of a North American vision for data communications is a big problem," Nevolo said. "Unlike many other parts of the world, we don't have a PTT that mandates standards for a national infrastructure."

The Alliance is currently working with other organizations, including the National Institute of Standards and Technology, to evaluate OSI products that meet user needs.

Membership in the Alliance is open to any user organization or individual with an interest in open systems.

X/Open Company Ltd.
1010 El Camino Real
Suite 380
Menlo Park, Calif. 94025
415 323-7992

Founded in 1984, this not-for-profit consortium's mission is to "increase the value of computing through the practical implementation of open systems." To this end, X/Open promotes the development of a vendor-independent computing environment consisting of interoperable products and technologies that have been designed and implemented in accordance with industry standards. The companies represented on the User Council include Ford, DHL, Texaco and the IRS; vendor members include Amdahl, Fujitsu, Hewlett-Packard, NCR and NEC.

X/Open has created the Common Applications Environment (CAE), a vendor-independent set of open systems specifications governing areas such as operating system interfaces, languages, source code and windowing. CAE is published in the X/Open Portability Guide (XPG3 is the current version). Products bearing the XPG3 brand are guaranteed to conform to CAE specifications. According to Bob Lewin, X/Open's vice president of North American Operations, approximately 350 products from 30 vendors have thus far been branded. (A list of branded products is available from X/Open.)

X/Open conducts what it describes as "the only ongoing international open systems user requirements study with published results." The data from this research (known as the Xtra process) helps keep X/Open's technical projects and the development programs of its members focused on relevant open systems concerns. The Xtra survey and an associated annual conference were formerly organized by vendors but are now the responsibility of the User Council. According to Lewin, the conference provides a much broader overview than in the past because it is attended by users, ISVs and systems integrators.

Xtra enables users (responsible for $30 billion worth of procurements annually) to join forces in an effort to influence vendors, according to Denis Brown, chairman of X/Open's User Council and director of the Center for Information Management in the Defense Information Systems Agency at the Department of Defense. "Even someone as large as the DoD doesn't have the buying power to shift the market," Brown said. "Collective buying power will make the vendors sit up and take notice."

Brown also appreciates the opportunities users have within X/Open to get together and share experiences. "All of us walked away from a recent conference with good ideas," he said. "It's a great way to expand approaches among ourselves." CIO

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Make Room for DASD

The challenge in data storage is not to expand the envelope, but to shrink it—while stuffing a lot more inside and at ridiculously lower costs. Meanwhile, bacterial, 3-D and holographic storage technologies are simmering in the lab.... Who would have thought storage could be so cool?

BY KATHLEEN MELYMUKA

By the 21st century, data storage may account for more than 80 percent of all data processing hardware budget dollars, according to the Gartner Group, a research and consulting firm in Stamford, Conn.

No wonder vendors are scrambling to develop superior new storage media—some of them using innovative, even bizarre, approaches (see related story, Page 66). Other vendors are combining existing technologies in novel ways to produce new storage systems that exceed the sum of their parts. Meanwhile, tape, magnetic and optical media continue to offer more speed and greater capacity in smaller packages and at lower cost.

The new technology everyone is talking about has actually been on the drawing board for some years. Redundant arrays of inexpensive disks (RAID) was the subject of intense research at the University of California at Berkeley in the mid-1980s. RAID is based on the premise that you shouldn't put all your data eggs in one basket because mechanical devices, no matter how good, will fail. Rather than risk all your mainframe data on a single large disk used in traditional, large-system, direct-access storage devices (DASD), RAID uses algorithms to spread data over groups of small disks called arrays.

To understand how RAID works, consider the Iceberg 9200 Disk Array Subsystem, announced in January by Storage Technology Corp. of Louisville, Colo., the leader in bringing RAID technology to market. The minimum configuration Iceberg, providing a total of 100 gigabytes of data storage capacity, uses 32 5.25-inch Hewlett-Packard disks, arranged in dual redundancy arrays of 16 disks each. (Dual redundancy means that data spread across one array is also spread across the second.) Bits of data are spread across 15 disks in each set while one disk in each is retained as a spare. Among the data are "parity" bits, redundant information that can be used to mathematically recreate any data that might somehow be lost.

To get from the drawing board to the motherboard, RAID developers had to solve a number of problems.

First was the incompatibility between large mainframe disk formats and 5.25-inch disk formats. The traditional large scale IBM DASD operates in a count-key-data (CKD) format. But smaller disks use a fixed-block-architecture (FBA) format. Functionally, arrays appear to the CPU as a single large disk. Physically, the data is organized on the arrays in a way that matches small-disk requirements. If disks within the array fail, the data can be reconstructed

ILLUSTRATION BY ROBIN JAREAUX

on the spare disk without interrupting operations.

A fault-tolerant design and "hot-pluggable" components minimize scheduled and unscheduled interruptions since any failed hardware except the motherboard can be replaced without halting operations.

(The term "redundant arrays of inexpensive disks" does not mean that the technology is cheap. The Iceberg product lists for from $1.3 million for the minimum configuration to $3.6 million for the maximum. And Storage Technology calls the technology "redundant arrays of *independent* disks.")

Another problem was handling the high speed of data flow from a mainframe CPU to a rotating storage device. Finally, there was the sheer volume of data to be stored on relatively small disks. "We have learned to build faster and better and more-reliable processors, but data storage technology has not kept up," said Nick Allen, program director at the Gartner Group.

Vendors are using "very intelligent controllers" to address these problems. "The biggest thing in the marketplace is intelligent controllers," said Allen. "It's not just the array; intelligent controllers provide availability and performance. That's the technology most important to users."

In the Storage Technology product, the intelligent controller translates from CKD format to FBA, keeping the operation transparent to the mainframe. Also, the controller includes a solid-state cache or high-speed buffer that helps neutralize the speed difference between the processor and the storage device. All data transfers go through the cache, which is not subject to the delays caused by rotation. In fact, the cache can accept the data as fast as a cable can carry it. From the cache, 14 pathways transfer data to and from the disk arrays, and each path can sustain a 5 Mbps transfer rate.

The problem of data volumes is solved with data compression and compaction, allowing the functional capacity of the array subsystem to far exceed the rated physical capacity. In compression, the controller looks for patterns and assigns a symbol, called a token, to patterned data. When the algorithm sees pattern A, it substitutes token A, which takes up less space. In compaction, the empty spaces between blocks of data are deleted. Compression and compaction can increase storage capacity and data-transfer rates by as much as 300 percent.

Proponents say RAID technology addresses two of the primary problems in direct-access storage devices: the need for data access 100 percent of the time, regardless of hardware failure, and the need to close the gap between the speed at which CPUs can transmit data and the speed at which DASDs can store it.

Proponents say RAID technology addresses two of the primary problems in direct-access storage devices: the need for access to data 100 percent of the time, regardless of hardware failure, and the need to close the gap between the speed at which CPUs transmit data and the speed at which DASDs can store it.

"We're on the crest of the wave in redundant arrays," said Allen. "They will become commodities in two to three years. The [Storage Technology] Iceberg product has captured users' imaginations and set the de facto standard, even though it's not shipping yet." (The product is currently being beta tested and is slated to ship late in the third quarter.)

While RAID is grabbing headlines, other storage technologies are not standing still—though their progress is somewhat less dramatic. Tape is still the medium of choice for historical data, and automated tape libraries (ATLs) using robotics have become relatively inexpensive at less than 50 cents per megabyte. Current tape libraries are arranged in silos, with the leading-edge configuration providing about 1.2 terabytes of storage capacity at 37 cents per megabyte.

By next year, some ATLs will be using helical-scan technology, which stores data in diagonal stripes along the tape, providing more capacity at lower cost. Helical-scan technology could increase the capacity of a 1.2 terabyte ATL to 120 terabytes while reducing costs to half a cent per megabyte.

DASDs are much faster but more expensive. Rotating DASDs run about $10 per megabyte. Solid state disks (SSD) are lightening fast, but at about $300 per megabyte, they should be. The big news in DASD is RAID.

Optical media sit somewhere between tape and magnetic media. They provide random access, like magnetic media, and have a longer life than tape, but they are relatively slow and comparatively expensive. The next generation of automated optical-disk libraries will cost around $12 per megabyte, but prices have been falling and are expected to continue to do so.

Some say rewriteable CDs, expected within the next few years, will be the heir apparent to the floppy disk. At any rate, falling prices and rising interest in imaging technology, for which optical media are the storage devices of choice, may pump up interest.

Finally, there's the hybrid "floptical" disk, a floppy medium with a barium ferrite coating. It runs on

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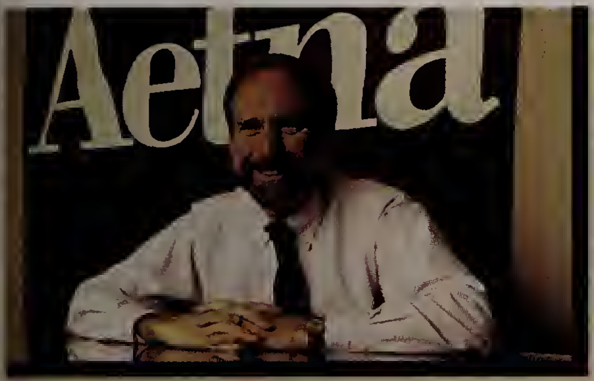

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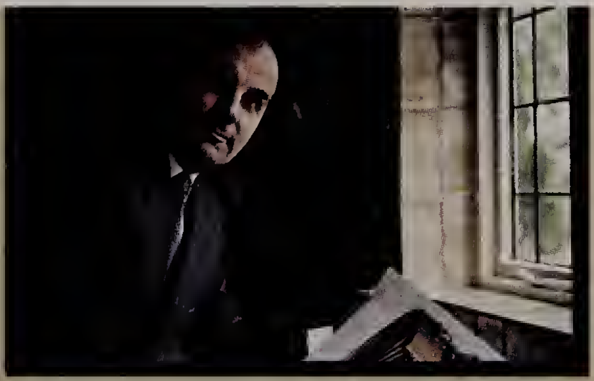

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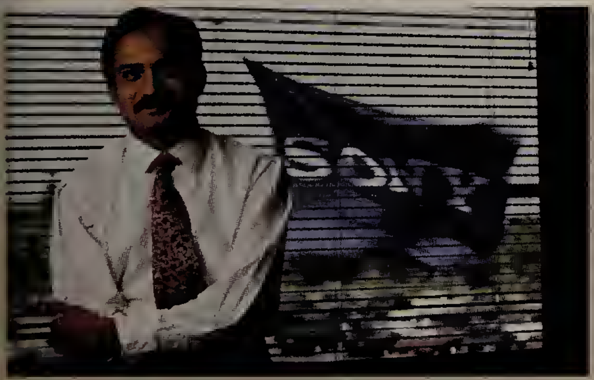

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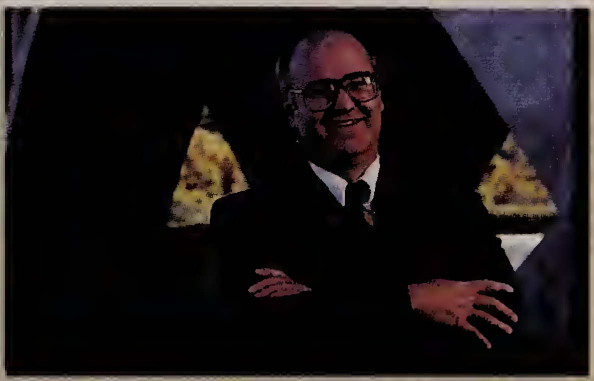

"The IEF tutorial is put together very well and quickly illustrates how to construct a system using the IEF. It gives one the basics to start getting the job done. I feel I am prepared now to build simple systems using the IEF."
K. E. Peacock
Data Administrator
City of Saskatoon, Saskatchewan

what looks like a floppy drive but reads more like an optical one, using reflected light, and records at a higher density for a 20MB capacity. At about $250, the drive is more expensive than a floppy drive, but at about $8 per disk, the cost per megabyte is a bargain.

While media are improving, Gartner's Allen reiterates that, in storage, the medium is not the message—the controller technology is. "Very intelligent front ends . . . will be *de jour* in a couple of years," he said. "It doesn't matter what [medium] is in back; it's managing and securing of data that's more important than storing it. That is the most significant technical evolution: controller technology and management systems."

Some say rewriteable CDs, expected within the next few years, will be the heir apparent to the floppy disk. At any rate, falling prices and rising interest in imaging technology, for which optical media are the storage devices of choice, may spur interest.

Even the leading-edge RAID doesn't really break new ground. It's more a matter of putting current technologies together in new ways. Industry watchers advise CIOs to think along the same lines. Said Allen: "Management of data and exploiting existing technology is more important than emerging technology for a CIO."

This Is Not Your Father's Mass Storage

In the future, rigid media will give way to 3-D cubes, holograms and protein-bearing microorganisms that turn on and off when exposed to light. Weird.

"We won't get out of magnetic media in this decade," said Nick Allen, program director at the Gartner Group research and consulting firm in Stamford, Conn. "The Hewlett-Packards and IBMs are fundamentally making that decision, and that becomes a self-fulfilling prophecy. They are committed to rigid magnetic recording devices for the rest of this decade."

The next decade, however, may bring new dimensions in storage—literally. The word on 21st century storage is 3-D, and magnetic and tape media may be replaced by crystals and even living organisms.

Most of the next wave of storage technologies use optical cubes of light-sensitive media and two intersecting laser beams to achieve capacities as much as 10,000 times what is possible in two dimensions, and at blistering speeds.

The optical block, for example, is a 3-D memory cube composed of light-sensitive material dispersed through a clear medium. When hit with a two-photon laser beam (one photon from each direction) of a certain wavelength, the molecule changes shape from closed to open, 0 to 1. While an optical disk theoretically can store 3.5 megabits per square centimeter, the cube potentially could store 6.5 terabits per cubic centimeter; and with no moving parts, access is expected to be 10 times faster. Cube proponents also promise random access, parallel addressing, small size and low costs, but the bad news is that even optimists don't expect to see it until the turn of the century.

Another spin on 3-D is holographic storage. Here the medium is a chunk of crystals or crystal fibers. Laser beams alter the crystal, causing it to store a charge as in a hologram. Like the 3-D cube, holograms are nonvolatile, with no moving parts. Costs are expected to be comparable to those of magnetic media, but holograms are expected to store 10 times more information and retrieve it as much as 1,000 times faster than today's systems. Unlike 3-D cubes, holographic memory is on the horizon. Commercial products should be available within the next few years.

Finally, you won't want to get the bugs out of your biostorage because the little mites will be the medium on which it operates. Researchers at Syracuse University are experimenting with a bacterium called Halobacterium halobium as a memory medium. When laser light strikes it, a protein in the bacterium changes its chemical shape and releases a small electrical charge. In other words, light turns the protein on and off like a binary switch. Researchers are predicting the critters will be five times faster than today's speediest medium and may someday store as much as 500 gigabytes in five cubic centimeters. No one is predicting precisely when we'll see them, but it won't be soon.

–K. Melymuka

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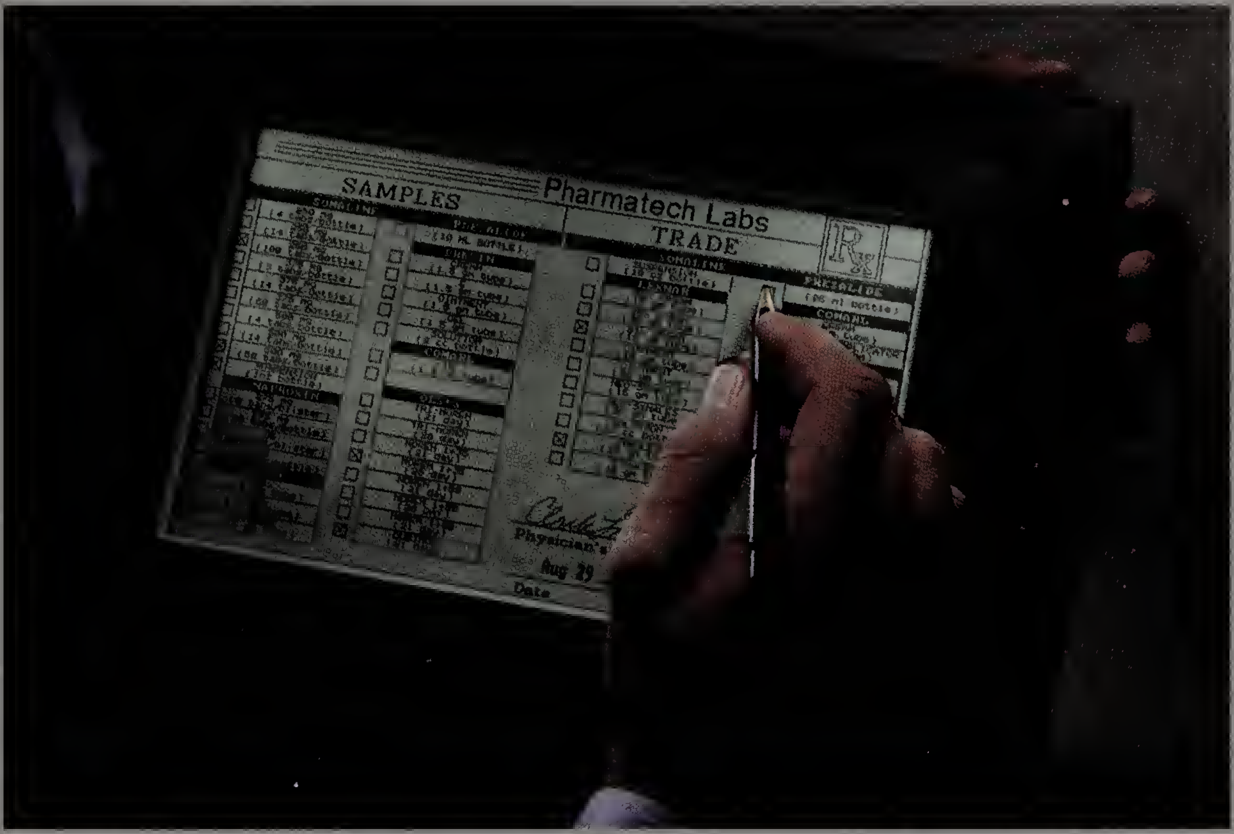
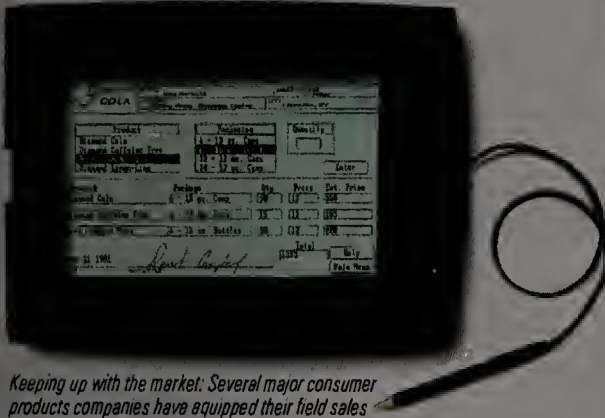


Pens for profit: A major pharmaceutical firm armed its U.S. sales force with 1000 GRiDPADS—and recouped their entire investment in 8 months.



Keeping up with the market: Several major consumer products companies have equipped their field sales operations with hundreds of GRiDPADS to quickly spot new market and sales trends.

Vrooom, vrooom: The Big Three and foreign automakers use GRiDPAD to speed inspections and conduct customer surveys.

Putting it on the map: Hundreds of field service crews use GRiDPAD to quickly locate electrical and gas lines.

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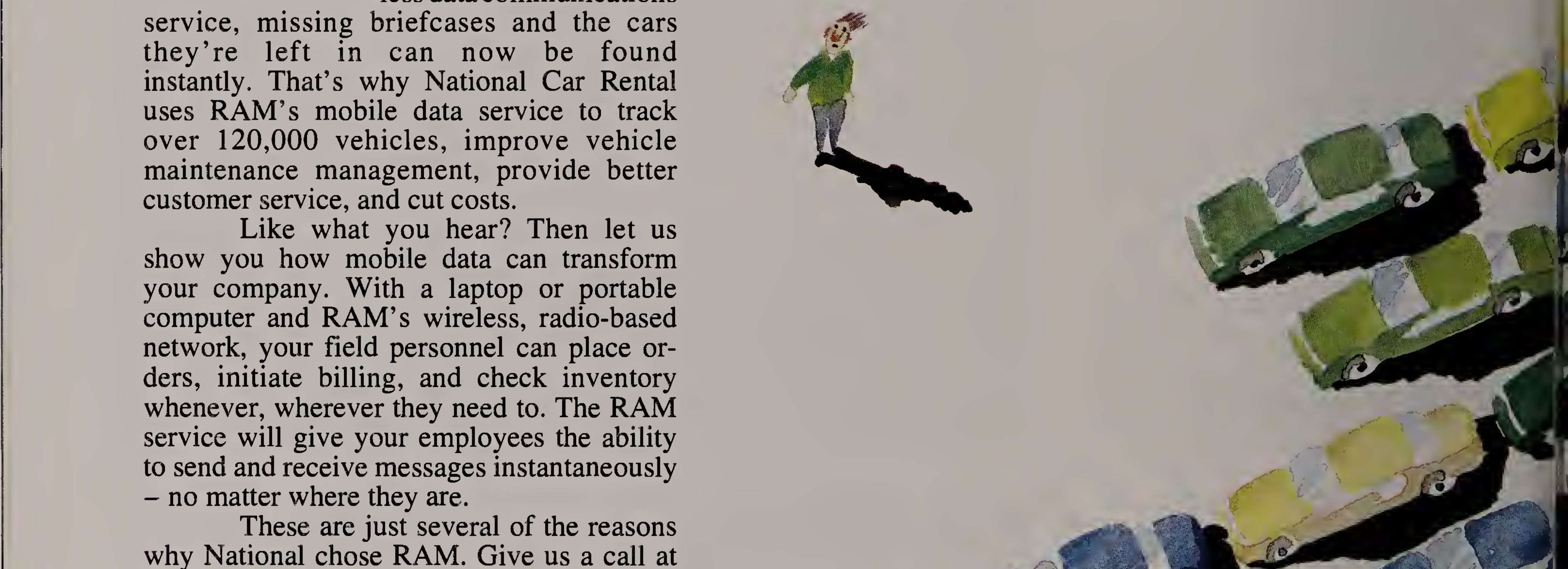

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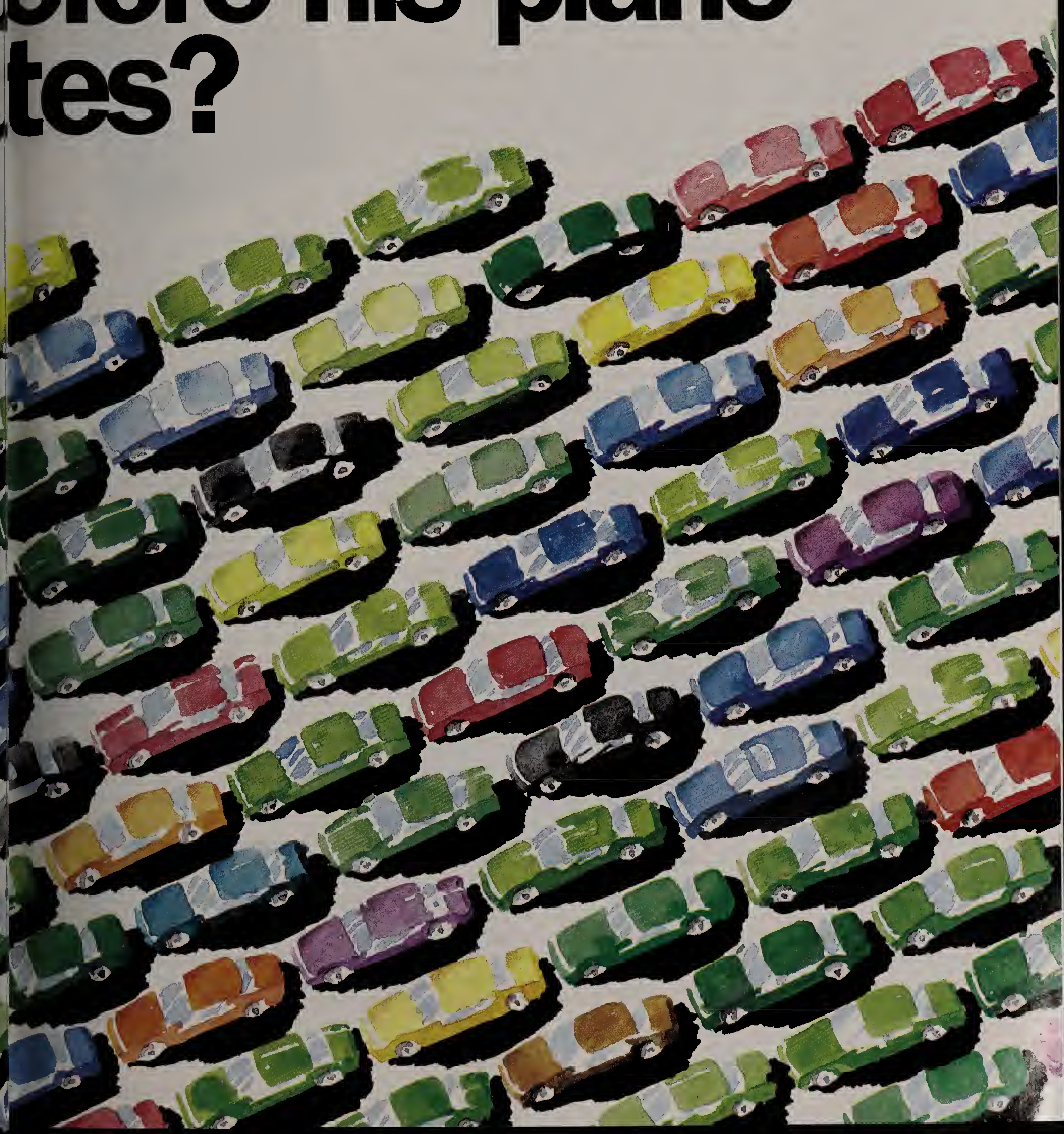

EVENTS

2nd Annual Object World Exposition and Conference

Moscone Convention Center,
San Francisco
July 20-23
Object Management Group and
World Expo Corp.
508 879-6700

Users and vendors of object technology will participate in tutorials, conference sessions and product/technology exhibits. Topics discussed in keynote sessions are the strategic role of object technology in software development and open systems. Registration fees: $295-$895.

SIGGRAPH '92

McCormick Place, Chicago
July 26-31
Association for Computing
Machinery
312 644-6610

Computer graphics and interactive techniques are the focus of this conference. Featured are demonstrations of high-performance computing and communications in a networked environment and interactive, stand-alone, research works-in-progress. Registration fee: $190-$665.

The Managing Enterprise Networks Conference

Sheraton, Boston
July 27-29
Network World and Digital
Consulting Inc.
508 470-3880

This conference provides information needed to manage corporate networks. Topics will include network-management platforms, frame relay, cost justification, enterprise internetworks and managing global networks. Registration fee: $895.

Business Process Reengineering from Concept to Execution

Chicago Hilton & Towers,
Chicago
July 30-31
Digital Consulting Inc.
508 470-3880

This seminar defines the critical success factors for the efficient reengineering of a company's business processes. The focus is on the relationship between processes and support systems, methods for working and procedures and tools for process modeling. Registration fee: $895.

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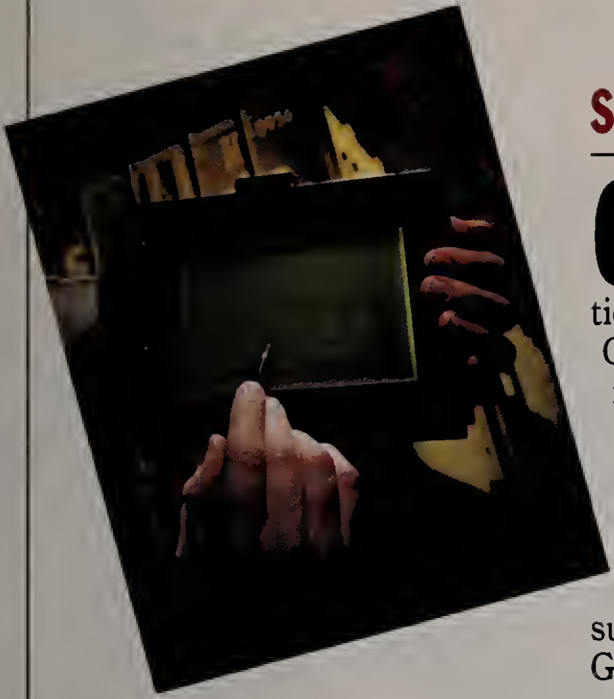


Swatch Computing

Company dress codes are about to get a lot more interesting if GRiD Systems Corp. has any say in the matter. The Fremont, Calif., company recently introduced PalmPAD, a 2.8-pound pen computer for data collection that can be worn on the wrist for comfort and to prevent dropping. GRiD envisions the product's use in industries that require data collection in the field. The ruggedized PalmPAD has a 9.5MHz NEC V.20 microprocessor, MS-DOS 5.0, 2MB of RAM, a slot for high-capacity solid-state storage cards up to 10MB, an eight-hour battery life and a 6.5-inch-diagonal, high-resolution 640x400-pixel LCD with adjustable backlighting. PalmPAD also features a combined power/serial port and cable that the user wears on a belt and which will accommodate future belt-mounted peripherals such as printers, magnetic-strip readers and extra batteries. Price is $1,995. GRiD can be reached at 510 656-4700.

Pen Pal

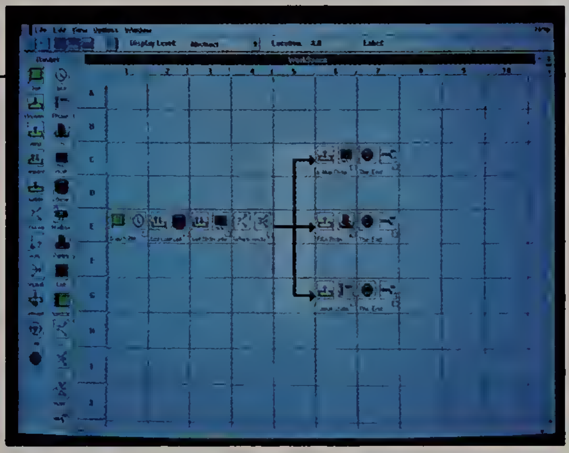
If the pen is ever going to be mightier than the sword, it's going to have to give users a way to manage their information. Pensoft Corp. of San Mateo, Calif., has introduced a software tool to help pen-computer users do just that.

The product, called Perspective, is built on an object database and utilizes an organizational tool called the Associate, which creates links across a Day Planner, Address Book, Notetaker and To Do List. For example, when a user enters an appointment into the software's Day Planner, the Associate links the name of that person to a profile in its database, which holds such information as address, phone number and last order.

The product uses Inkwell, a paper-based personal stationery that allows users to jot down appointments, notes and even drawings. Anything entered using Inkwell can be selected for translation into typed text, which can in turn be linked or retrieved.

Perspective will run on the PenPoint pen-based operating system from Go Corp. Suggested retail price is $299. For information call 415 358-1575.

Special Deliverer



Edify Corp., a Santa Clara, Calif., start-up, is beta-testing a product that might make end-user programming a potent reality.

The company's Information Agent promises to give users the ability to train a corporate computer network to automatically gather and analyze data residing on hosts or network servers, and then to send that information to customers, vendors or other employees. Users can set up applications without programming: They just organize icons representing actions and items like telephones and computers into a workflow diagram. With Information Agent, users can set their companies' computer networks to automatically deliver information (such as delivery dates, price lists or promotional literature) on demand or on a regular schedule by fax, E-mail or telephone, 24 hours a day.

Pricing for the first release of Information Agent, consisting of both hardware and software, starts at $60,000. Call 408 982-2000.

A System with a View

Distributing information—particularly if it involves graphics—can be a time-consuming and costly proposition. WorldView, from Interleaf Inc., enables users to view text and graphic documents from virtually any source on virtually any computer and provides full-text retrieval and hyperlinks to the information.

The system consists of two pieces. WorldView Press takes documents from a variety of sources (major word processors, desktop-publishing packages, CAD software), reformats them for online viewing, compresses them and adds hyperlinks and a full-text index. The resulting documents can be viewed on PCs, Macintoshes, workstations and mainframe terminals. The second component, WorldViewer, allows end users to view the documents, attach electronic "sticky notes," use the hyperlinks and full-text-retrieval capabilities, zoom in and print copies on any standard printer. One early user has replaced 60,000 pages of field-service books with a CD-ROM containing the product.

WorldView Press costs $10,000; the end-user price for WorldViewer is $195. For more information call 617 290-0710.

Waste Not, Want Not

When a federal systems integrator reengineered its business activities and the systems that support them, it wrung extra value from the process by marketing its method to clients and converting its discarded mainframe into a service bureau/hot site

Two years ago, when HFSI, a federal systems integrator and Bull HN subsidiary in McLean, Va., changed its business focus from selling proprietary hardware to offering vendor-independent systems integration services, the IS department had to overhaul the company's 22 internal business systems and develop enterprisewide Unix-based systems to support the new mission. HFSI got extra mileage from the project by using it to showcase its integration skills. What's more, rather than relegate the old mainframe to the scrap heap, the company has converted it into a revenue-producing service bureau and disaster-recovery hot site.

Before October 1990, HFSI's business systems ran on a Honeywell mainframe from the 1960s. Over the years, individual systems were added piecemeal, creating inefficiency and data redundancy. For instance, the mainframe ran three separate order-processing systems for hardware, software and services. HFSI wanted to combine the three into one system, which it would in turn integrate with all other systems. But first IS had to develop an understanding of business functions and how the respective systems would ultimately fit together.

To nail down the organization's major business activities and set priorities, IS strategic planners interviewed 200 upper-level employees throughout the company. They used flowcharts and Texas Instruments' Information Engineering Facility to diagram and reengineer these activities. At the same time, they prescribed the specific technologies that would support them. This concurrent approach ensured that the new plan would be technically feasible.

"Our goal was to replace all the proprietary systems developed in-house with open systems, using as much commercial off-the-shelf software as we could find," said Cheryl Smith, director of information systems. (Only 30 percent of the new software had to be developed in-house.) The new systems would run on Unix-based minis from Sun, Sequent, AT&T and Bull, with an Oracle relational database management system making it possible to have a single source of data for applications enterprisewide.

To date, most of the systems have been moved off the mainframe, with the rest slated to be moved by the end of this year. One new system is brought online every six weeks. When the project is complete, other technologies—such as EDI for order-processing and -tracking, and CD-ROM for managing contract information—will be integrated as well.

The company has reaped many added benefits from the project. For instance, it integrated an SQL-based version of Artemis Prestige, a project-management product from Lucas Management Systems of Fairfax, Va., into the reengineered service-support system, and Smith reports that the vendor may license the enhancement.

The project itself was such a well-orchestrated success that it has proven to be an effective marketing tool for the company's services. In fact, plans call for merging the IS group with the consulting practice in order to offer customers the skills developed during the overhaul.

And to let nothing go to waste, the mainframe has been given an unexpected second life as a service bureau and disaster-recovery hot site for internal customers and on a fee-for-service basis to external customers. "We're in a wonderful position," Smith said, "because there's a limited number of Honeywell service bureaus. I might not have made the same decision if I was moving off an IBM."

–Megan Santosus

VITAL STATISTICS

Organization: *HFSI, McLean, Va.*

Application: *Totally integrated distributed business systems*

Scope: *1,500 employees enterprisewide*

Technologies: *A TCP/IP network with intelligent hubs and FDDI backbone linking 1,200 PCs and various minis running Unix-based off-the-shelf software*

Objective: *To redesign internal business systems to support a changing focus*

Payoff: *Increased efficiency and eliminated data redundancy (to the extent possible), with new systems developed every six weeks*

Value Added: *Mainframes have been converted to service bureaus and disaster-recovery hot sites; internal processes are being marketed externally*

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